Novartis's Knowledge Network Page 30

CIO Enterprise

SECTION

MARCH 15, 1999
158 PAGES IN
TWO SECTIONS

Is Business Education Missing IT?

SPECIAL REPORT An Inside Look at the Country's Top MBA and Executive Ed Programs

Starting on Page 40

Also Inside

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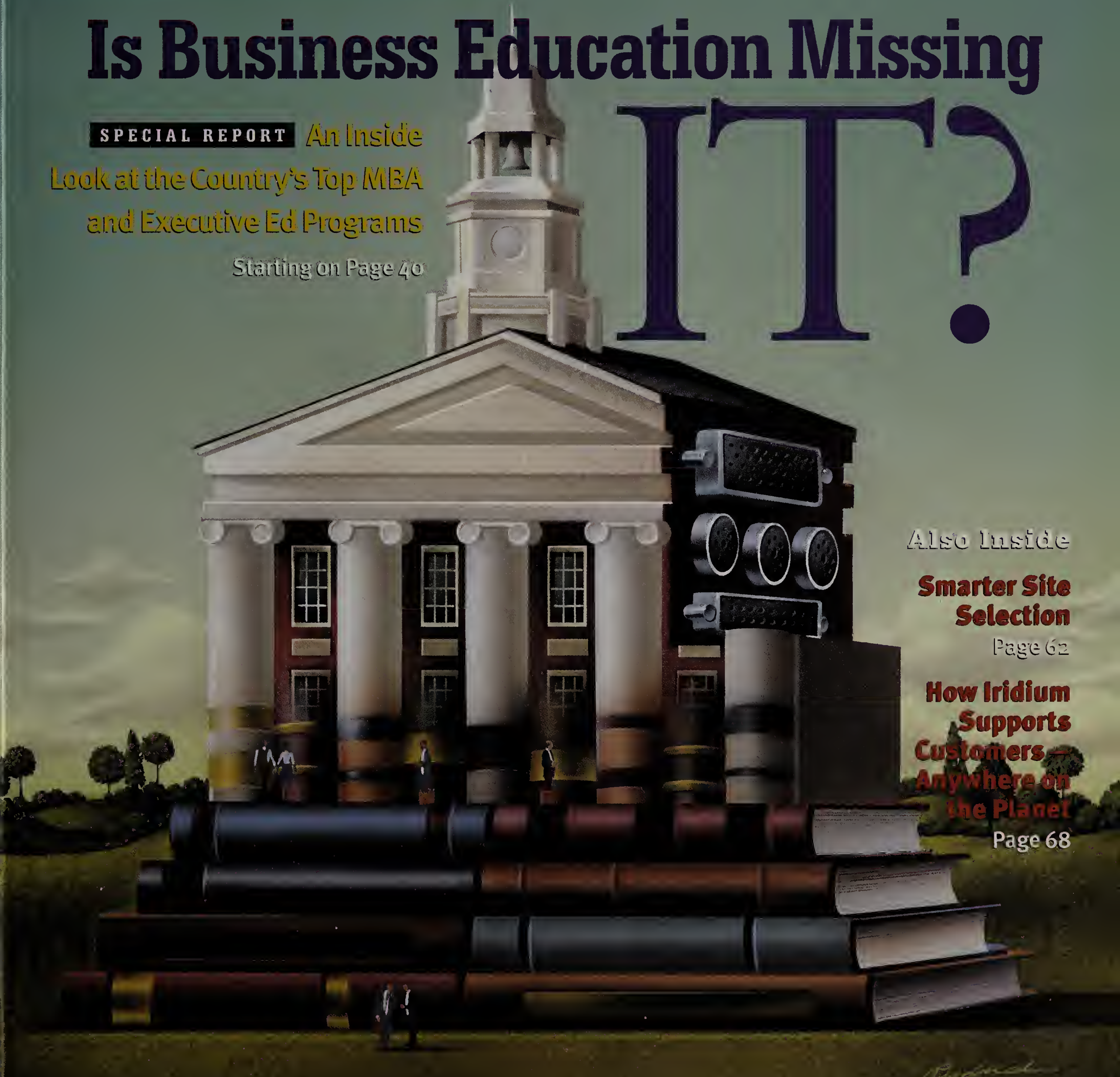

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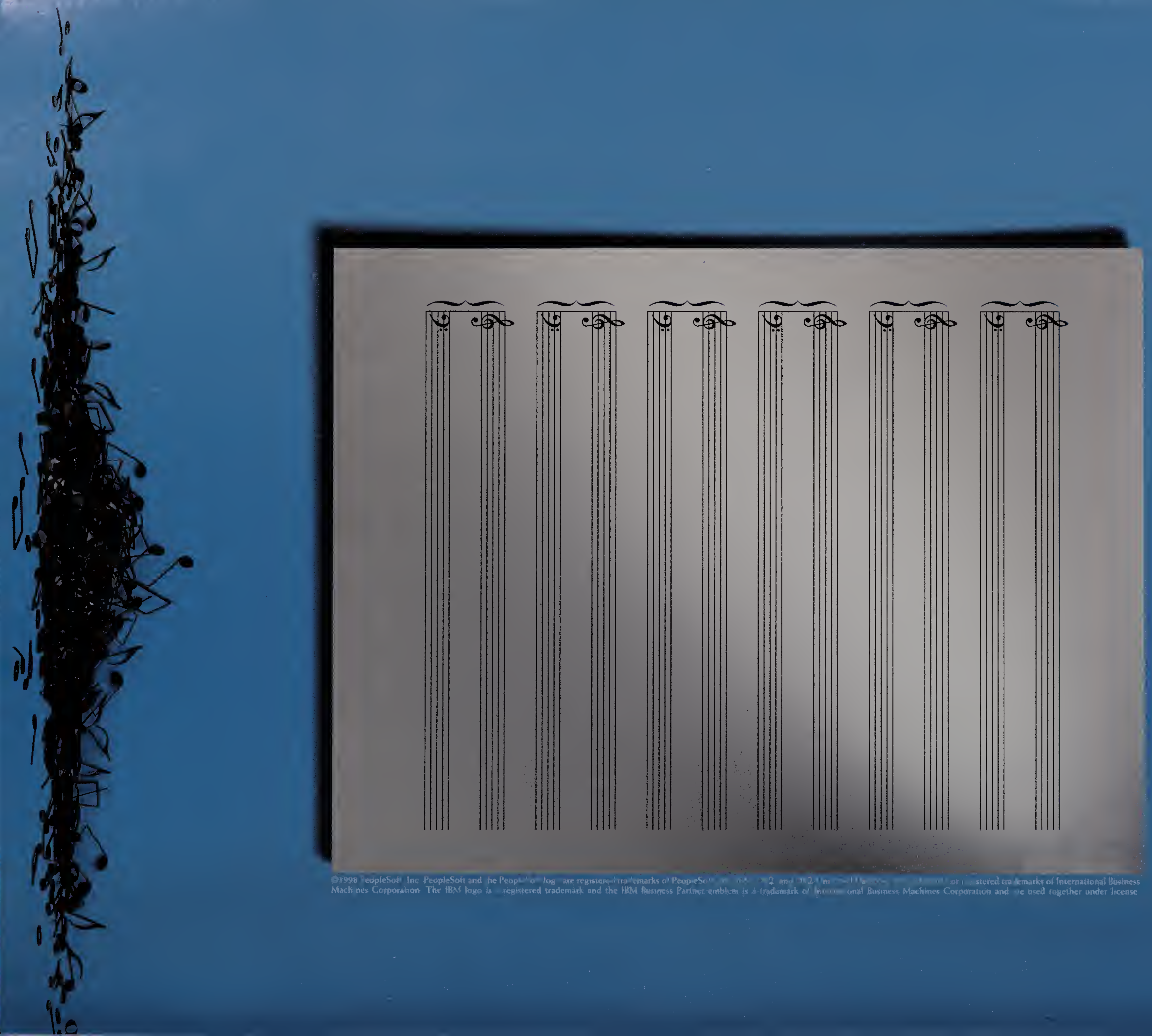

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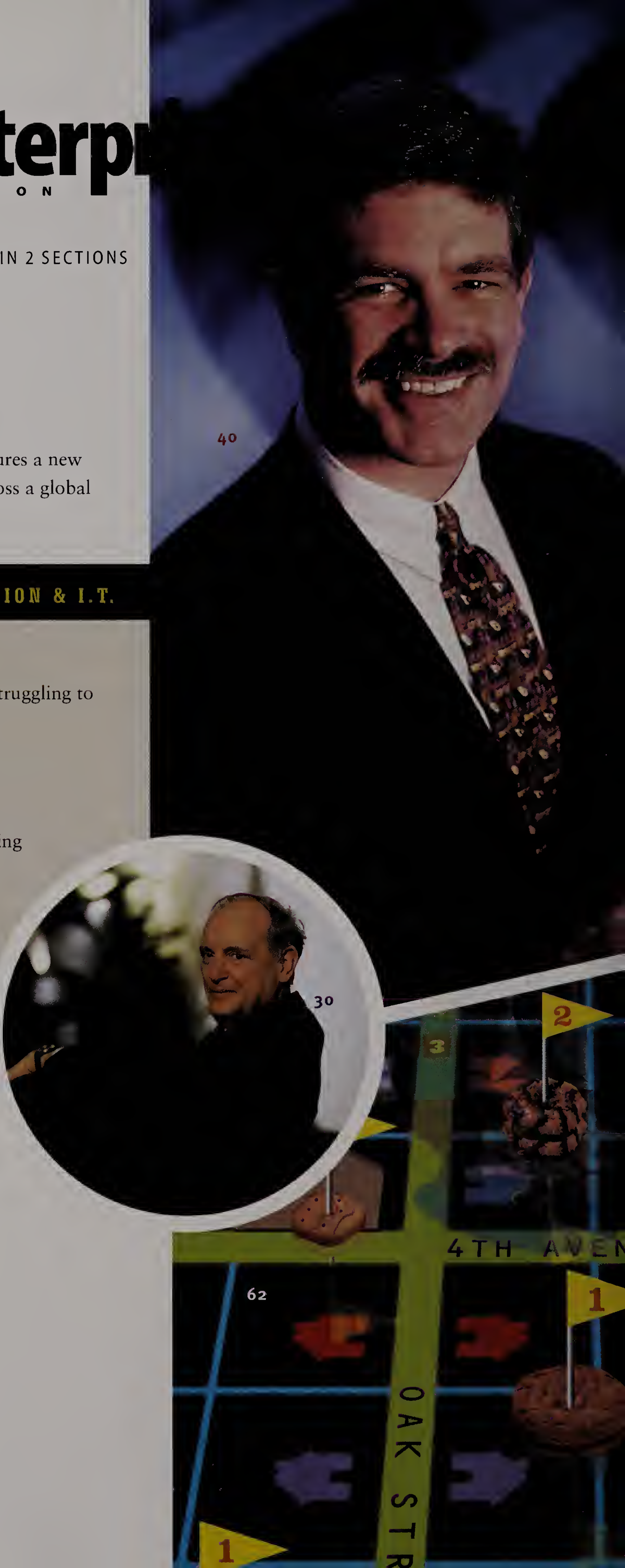
SECTION 2



Features

30 **Wiring the Corporate Brain**
KNOWLEDGE MANAGEMENT Novartis ventures a new strategy for sharing ideas and innovation across a global enterprise. *By Gary Abramson*

SPECIAL REPORT: BUSINESS EDUCATION & I.T.

40 **Needs Improvement**
MBA PROGRAMS Top business schools are struggling to integrate technology across their curricula.
By Carol Hildebrand

50 **School Choice**
EXECUTIVE EDUCATION PROGRAMS Looking for a good dose of strategic technology in an executive education program? Better shop around. *By Perry Glasser*

62 **Mapping Your Success**
GEOGRAPHIC INFORMATION SYSTEMS GIS used to be the secret weapon in business-site selection. Now everybody's using it, but smart companies are finding new ways to profit from the not-so-new technology. *By Daintry Duffy*

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CIO Enterprise SECTION

Columns

26 **Don't Shoot the Messenger**

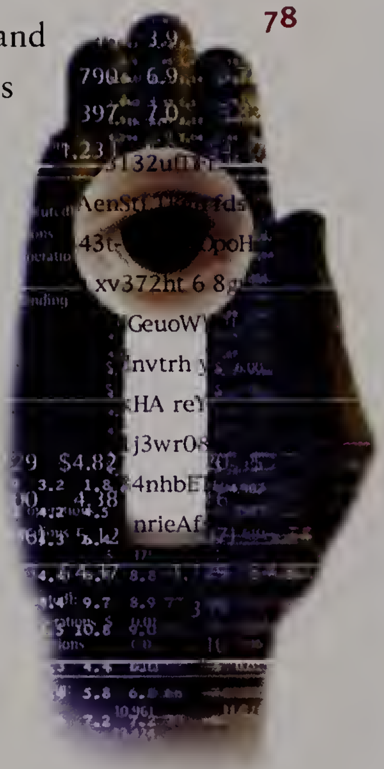
REALITY BYTES Widespread panic about Internet fraud ignores common sense. *By Megan Santosus*

68 **Operator Assistance**

HANDSHAKE Iridium's satellite telephone network delivers communications—and customer service—to A-list customers in some of the most remote spots on earth. *By Tracy Mayor*

78 **What's Encryption?**

LEARNING CURVE When it comes to systems security, it's better to be safe than sorry. *By Perry Glasser*



78

Departments

10 **Contributor's Page**

12 **In My Opinion**

Letter from the publisher • On our Web site

16 **Plugged In**

Readin', Writin' and Boolean Logic • The Dollar Vanishes • Clicking the Night Away • Cookin' Up a CFO • The Incredible Flatness of Being

76 **Index**

16

CIO
THE MAGAZINE FOR INFORMATION EXECUTIVES
ALSO INSIDE
Freeware in the Enterprise
PAGE 42
Are Retention Bonuses Effective?
PAGE 36
A Lead-Pipe Cinch
Estimating Jobs Down to the Last Weld Puts Turner at the Top of its Industry

Inside Section 1

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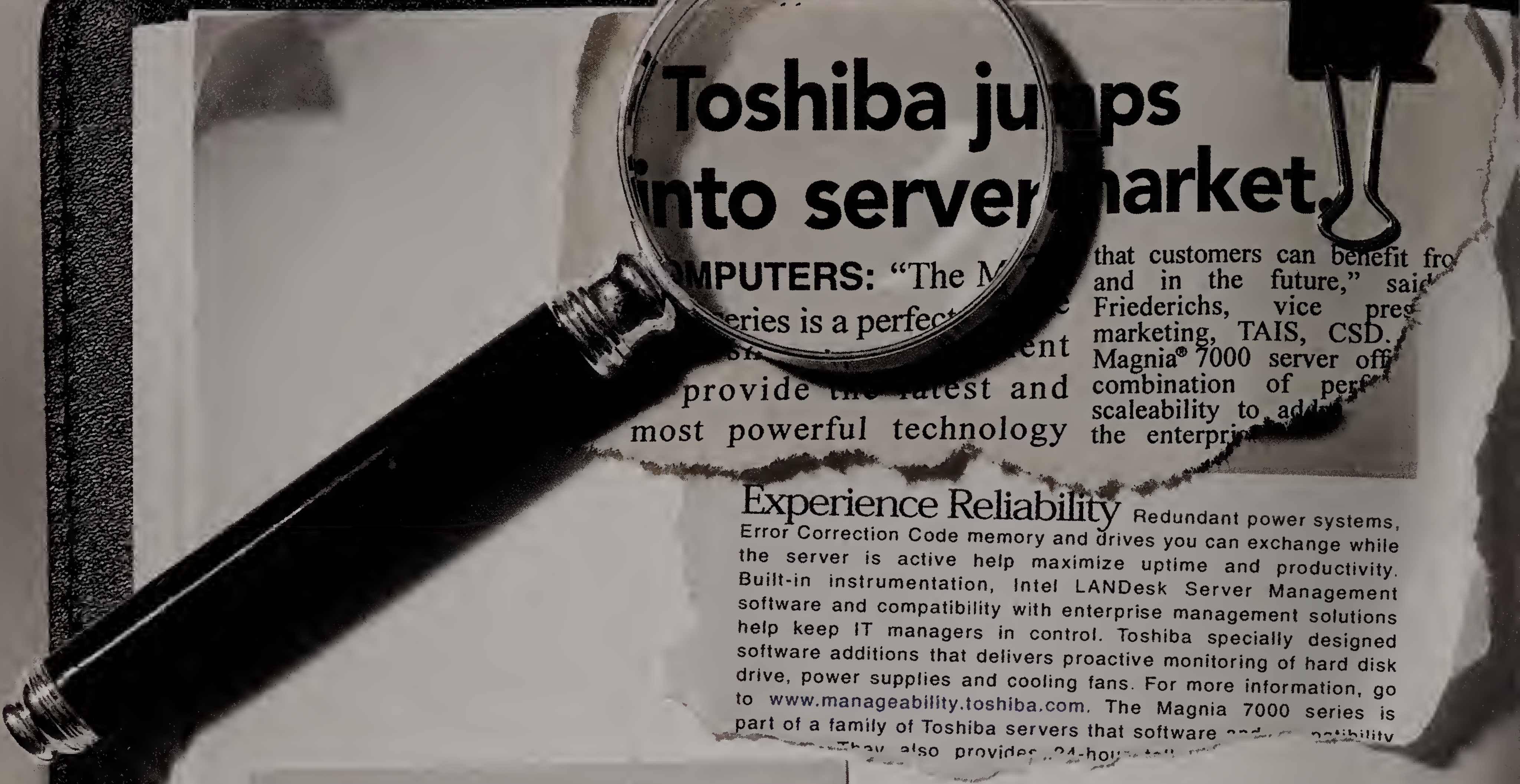

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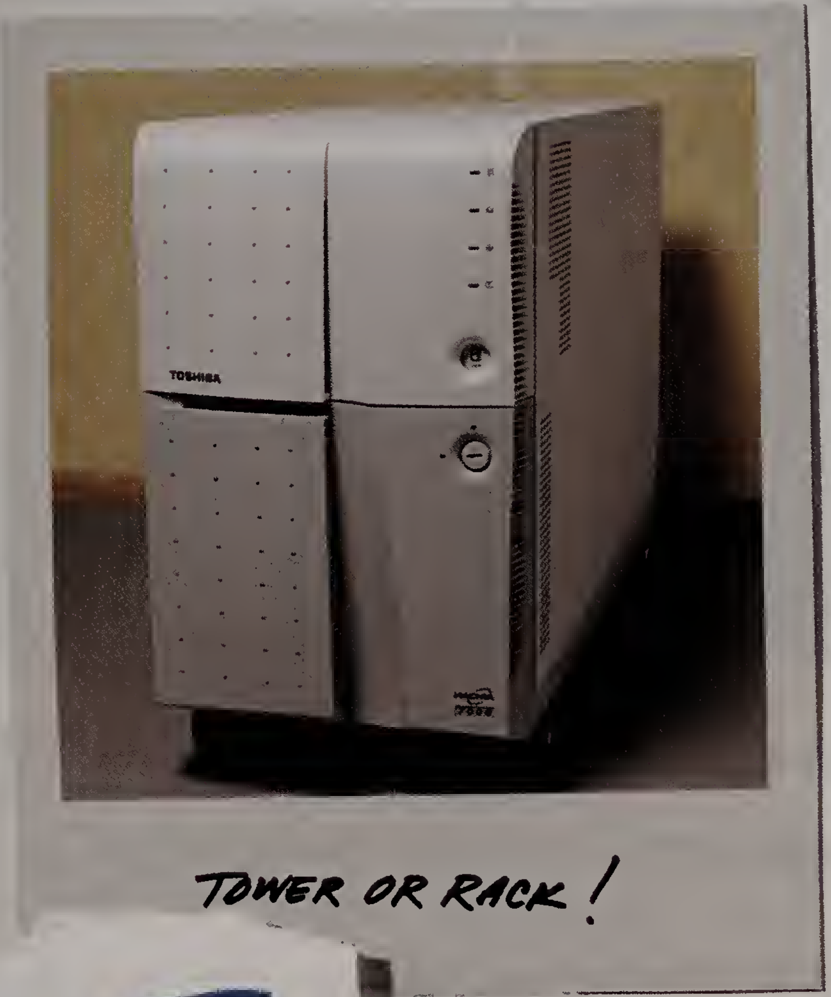

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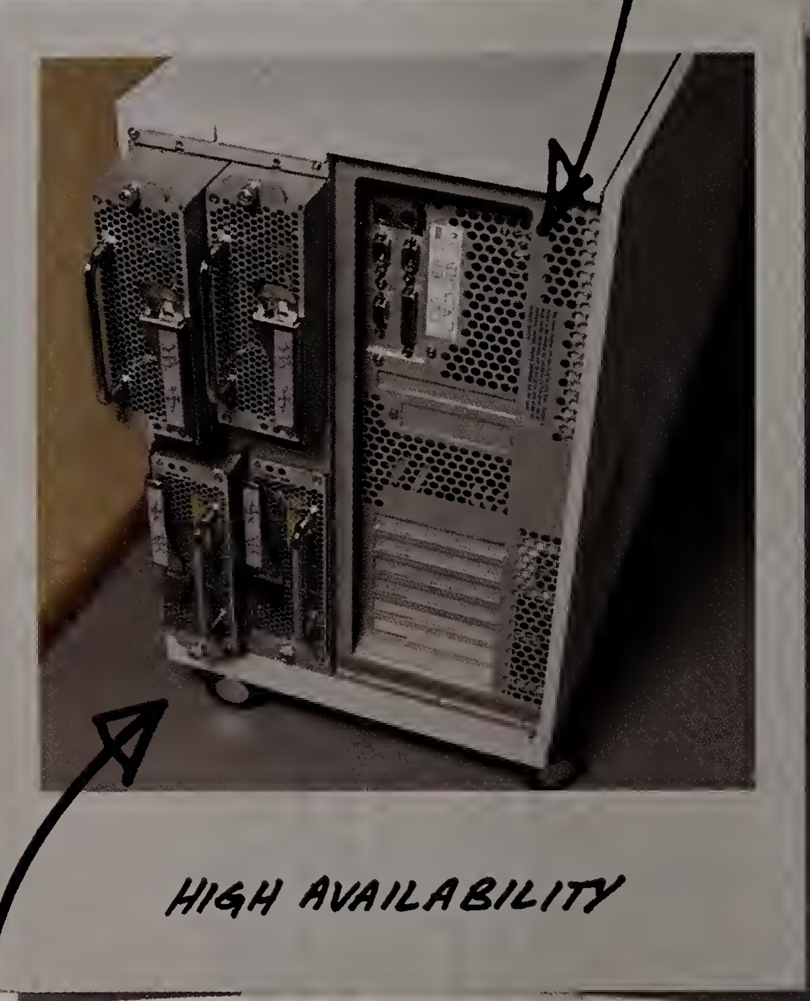

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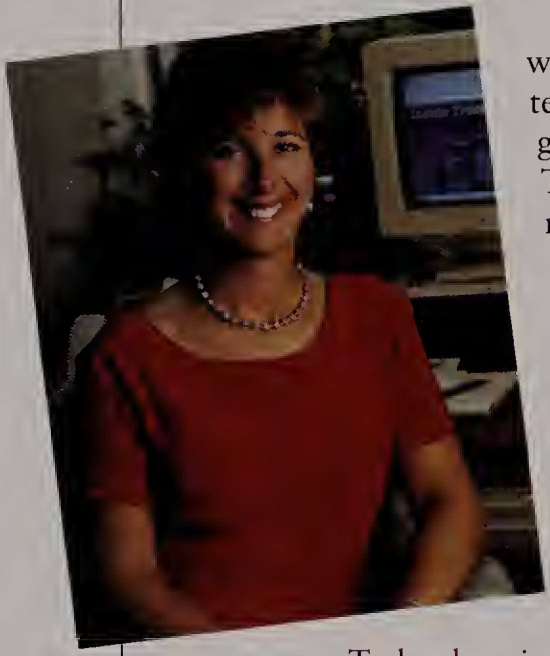
Re: Who's Teaching Whom?

Why are business schools laggards when it comes to technology?

I'VE ALWAYS BELIEVED THAT IF YOU want to learn something, the obvious place to go is school. After all, schools are in the business of collecting very smart people—leaders in their fields—and paying them to impart their wisdom to us less-than-experts.

But it seems I'm naive. Business schools, for example, don't have thought leaders in information technology. Instead, academics are busily keeping one frantic step ahead of the students or importing teachers from innovative companies (see "Needs Improvement," Page 40 and "School Choice," Page 50, which look at the state of strategic technology in MBA and executive education programs).

Donald Jacobs, dean of Northwestern University's Kellogg Graduate School of Management, freely admits that while his faculty is at the cutting edge of traditional areas of business, such as finance and marketing, "in technology, industry is ahead of us. We have to rely on industry [people] to come back and teach our avant-garde courses. And we think it's going to be like that for the next decade."



But why? Why are business schools laggards when it comes to thinking strategically about technology? Philip Anderson, who teaches strategic technology classes at Dartmouth College's Tuck School of Business, says it's because technology isn't a pure science; it's an applied one. (Apparently, if IT were a pure science, those business professors would be digging into IT research like Julia Child attacking a slab of foie gras at a four-star restaurant.) When Anderson wants to talk to people on the IT frontier, he turns to venture capitalists and securities analysts, not fellow academics.

This troubles me because I always thought business schools were there to illuminate and help solve pressing corporate problems. Technology is, by any account, a pressing business problem. Unfortunately for businesses, it's not a pure science.

Many schools do have IT-related research institutes populated by companies—which pay a fee for membership—that exchange information and suggest research topics. But again, who's teaching whom in this situation? Why go to a business school to learn how to be smart about technology and business if the faculty knows no more, and sometimes less, than corporate America? Perhaps there's a better way to learn about strategic technology and its impact on business—or perhaps one will appear through newer channels such as the Internet, corporate consortia or corporate universities. If anybody out there has any ideas, I'd love to hear them.

Carol J. Hildebrand

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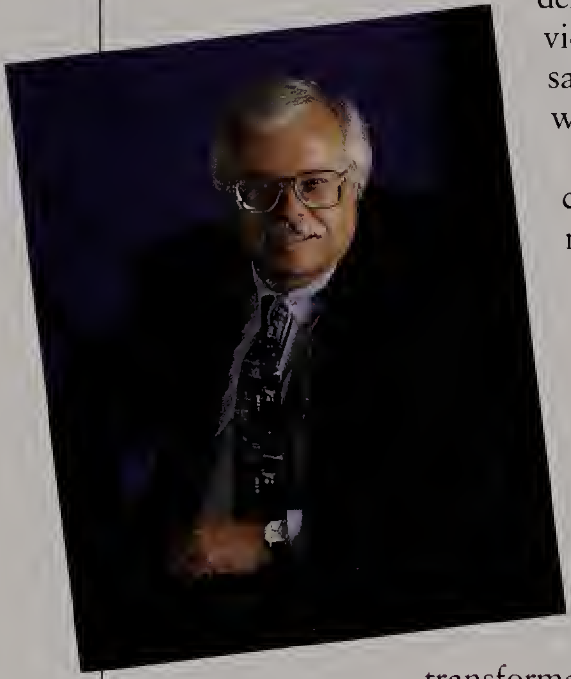
In My Opinion

CIOs are embracing Internet standards to simplify the technology infrastructure.

WE ARE AT THE BEGINNING of the Age of the Interprise. What is the Interprise? The Interprise is the fusion of the enterprise and Internet computing.

It has taken a few years, but Internet-based technologies are finally becoming embedded in enterprise software. Yet not every software vendor has gotten the message. Oracle Corp. and its Chairman and CEO Larry Ellison have gotten the message and responded accordingly.

Ellison saw the potential of the Internet and embraced it back in 1995 before Oracle could deliver all the goods. Oracle is now delivering the goods, and the Internet provides a corporate direction that has universal appeal consistent with where customers want to go.



Ellison's new mantra, "the Internet changes everything," is right on the money. It has changed everything for Oracle and it could change things for Oracle's customer base as well.

However, big alterations take longer to permeate enterprise software because the products have a high legacy factor. And bringing in another server to host a Web site is easier than remaking an order-entry system to handle e-commerce over the Web.

CIOs are going through the same transformation Oracle is—Internet-enabling their enterprises from an infrastructure and business process perspective.

The enemy to all CIOs, of course, is complexity. The layers of concrete amassed through generations of technology waves are becoming impossible to navigate and control. Complexity renders systems unmanageable, projects get delayed and service levels drop.

Starting over isn't an option for most organizations. Injecting the enterprise with a dose of Web-based technology to unlock data and establish common rules across databases and applications is the best alternative. Like Oracle, many CIOs are embracing Internet standards as a way to simplify the technology infrastructure and create commonality internally and externally.

Will your organization jump on the Interprise computing bandwagon? Is your technology infrastructure ready for the new era?

Joseph L. Levy
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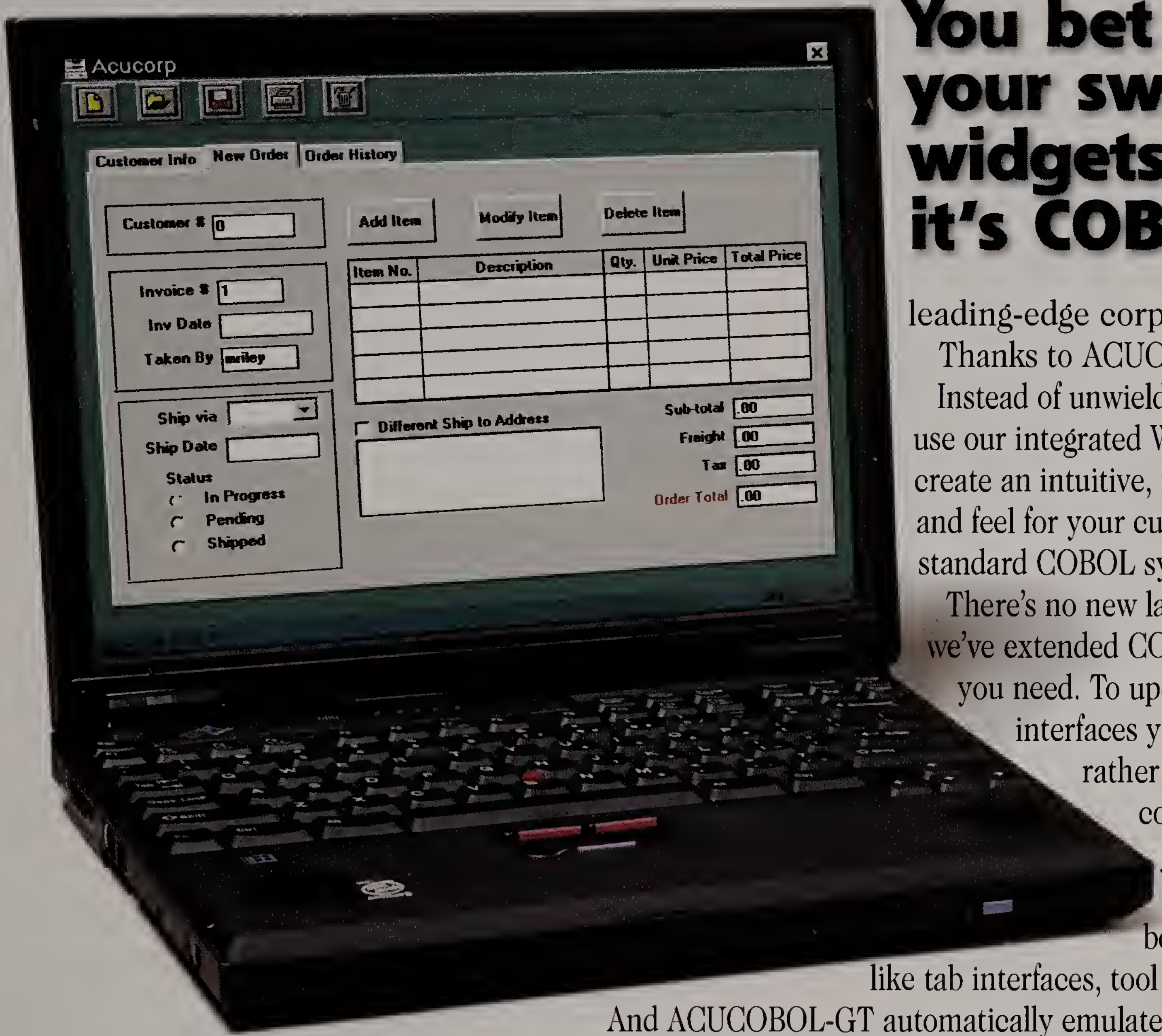

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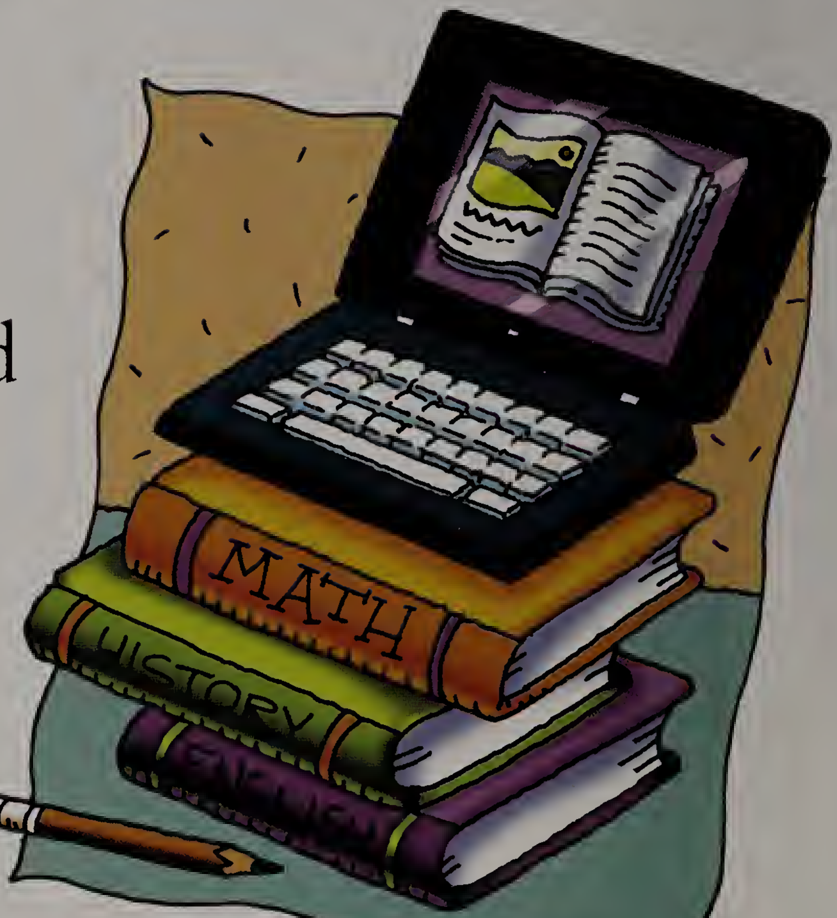

ONE OF THE TENETS OF CHILDHOOD is that kids are supposed to complain about going to school. But 60,000 students around the country are not only forgetting to complain, they're jumping at the chance to bring school home with them.

The reason behind this collective change of heart? A corporate-sponsored program that is providing students in seventh and eighth grades at more than 250 schools an opportunity to buy their own laptop computers. The program, called Anytime Anywhere Learning, is sponsored by Microsoft Corp. and aims to engage students in the learning process through the use of technology.

Microsoft equips the laptops—provided by Toshiba America Systems Inc., Acer America Corp. and Compaq Computer Corp., which also offer phone and technical support—with Microsoft Professional Office at a substantial discount. The participating companies sponsor an annual learning summit that lets educators share best practices for laptop learning.

Students and parents who participate in the program must find a way to buy the laptops, either outright or with the help of low-interest loans. Several school districts offer scholarship funds for students who cannot afford to buy them on their own.

Proponents of the program, and there are many, say Anytime Anywhere Learning is turning students into more enthusiastic learners. **Walter Buster** is superintendent of Clovis Unified School District in Fresno, Calif., which has been participating in the program since its inception three years ago. Today 1,100 students in his district have laptops. How do parents react to the proposition of outfitting their preteens with state-of-the-art computers? "Initially people are surprised that we think a seventh or eighth grader can carry around a laptop all day," admits Buster, but he says the students' sense of ownership and responsibility have come as a pleasant surprise. "They name them, they put stickers on them," he says, adding that kids rarely misplace or damage the expensive investments. Classrooms have seen higher levels of motivation and greater engagement in the learning process, according to teachers and administrators. An October 1998 study (sponsored by Toshiba and Microsoft) notes

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In Their Own Words

> **"Technology is a queer thing. It brings you great gifts with one hand and stabs you in the back with the other."**
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improvements in student collaboration, critical thinking and problem-solving proficiency among participating students.

Annette Bitter, who teaches seventh grade history and language arts at Alta Sierra Intermediate School in Clovis, Calif., would not argue with those conclusions. Bitter, one of the program's pilot teachers, says, "Computers lend themselves to kids being independent learners and enable them to produce quality products that they're really proud of." She cites a unit on the Mayas that she teaches in her seventh grade history class. When presented with the lessons in the textbook alone, students' interest levels remain low. But a trip to the Internet for additional information yields an exponential rise in Mayan enthusiasm. The program serves as a valuable learning opportunity for teachers too, many of whom have had little prior computer training and must take a learn as you go approach. Another unanticipated benefit is simplified communication between parents and educators because teachers are accessible through e-mail.

Critics have argued that computer-based learning can impair children's creativity and motivation. Not so in his school district, says Buster, who is hoping to extend the program into Clovis high schools. "We're really opposed to a 'drill and kill' computer. Students have to stretch and use [the laptop] as a problem-solving device."

–Meg Mitchell

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Money Book

The Dollar Vanishes

PEEK INTO YOUR PURSE AND COMMIT TO MEMORY JUST WHAT FOLDING money looks like. Just as today you have to visit Fort Knox to see gold ingots, in the not very distant future you'll have to visit a museum to see cold, hard cash.

That's the scenario predicted by anthropologist Jack Weatherford, author of *The History of Money* (Crown Publishing, 1997). "Money was invented to make wealth transportable," Weatherford says. "Since modern electronics have eliminated geographic barriers, money can now be anywhere at any time." Weatherford says that money has gone from metal to paper and will soon become exclusively a digital medium, except for those who cannot muster credit—poor people and poor nations.

With less than 10 percent of the world's money supply now actual cash, Weatherford expects the transition to digital dollars will take no longer than it took the world to embrace checks and credit cards. But before you start using your greenbacks for kindling, bear in mind that Weatherford cautions that a digital monetary system is not without risks. As banks, credit card organizations and telecommunications companies increasingly generate digital dollars, governments will eventually lose control of the monetary supply. Weatherford also expects new kinds of financial crimes, so keep your hand firmly on your wallet.

Hmm. Make that your smart card. ■

Online Education

Clicking the Night Away

SO YOU WANT TO ADVANCE your career through education, but your schedule—between family, work and travel—is packed as tight as a pint of Häagen-Dazs and the mere thought of sitting in class for three hours after work sounds as exciting as a warm beer. You might try a form of distance education known as an asynchronous learning network (ALN), in which groups of remotely connected individuals take classes via the Internet or group software.

ALNs provide flexibility to people who work full time and whose hectic lifestyles can't accommodate the regimented schedules of traditional, campus-based university courses. The word asynchronous implies that students participate according to their schedules, anywhere and anytime they have access to a computer and the Internet. ALNs contrast with traditional night classes or part-time graduate programs where a student is required to be in a specific place at a specific time.

The College of Information Science and Technology at Drexel University in Philadelphia offers an asynchronous, three-year master's degree program in information systems, made possible by a 1996 grant from the Alfred P. Sloan Foundation. Structured around weekly modules, professors post reading assignments and questions in a Lotus Notes database. The roughly 25 students in each class respond to the questions and collaborate through e-mail messages on other long-term assignments such as designing an information system, writing a program or conducting a system evaluation, says **Mike Rogich,** director of Drexel's Sloan Center for Asynchronous Learning. For more information, visit *www.cis.drexel.edu/aln.* ■

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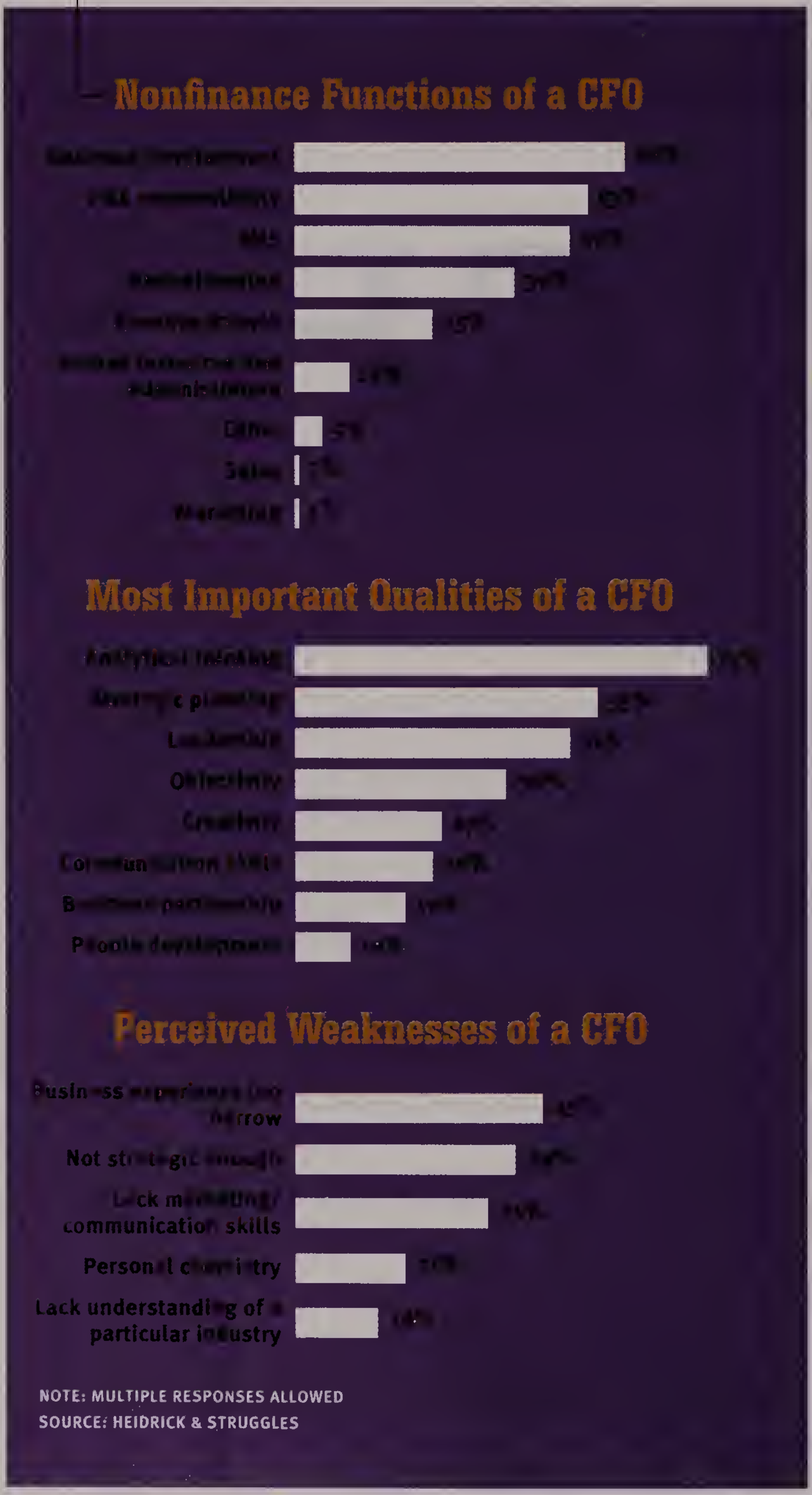
Corporate Roles

Cookin' Up a CFO

WHAT MAKES FOR A WINNING CHIEF FINANCIAL officer these days? Belly up to the executive recruiting counter and listen to what today's CEOs are ordering: "Make mine a CFO with all-around business ability, an extra helping of long-term strategy and, please, hold the bean counting."

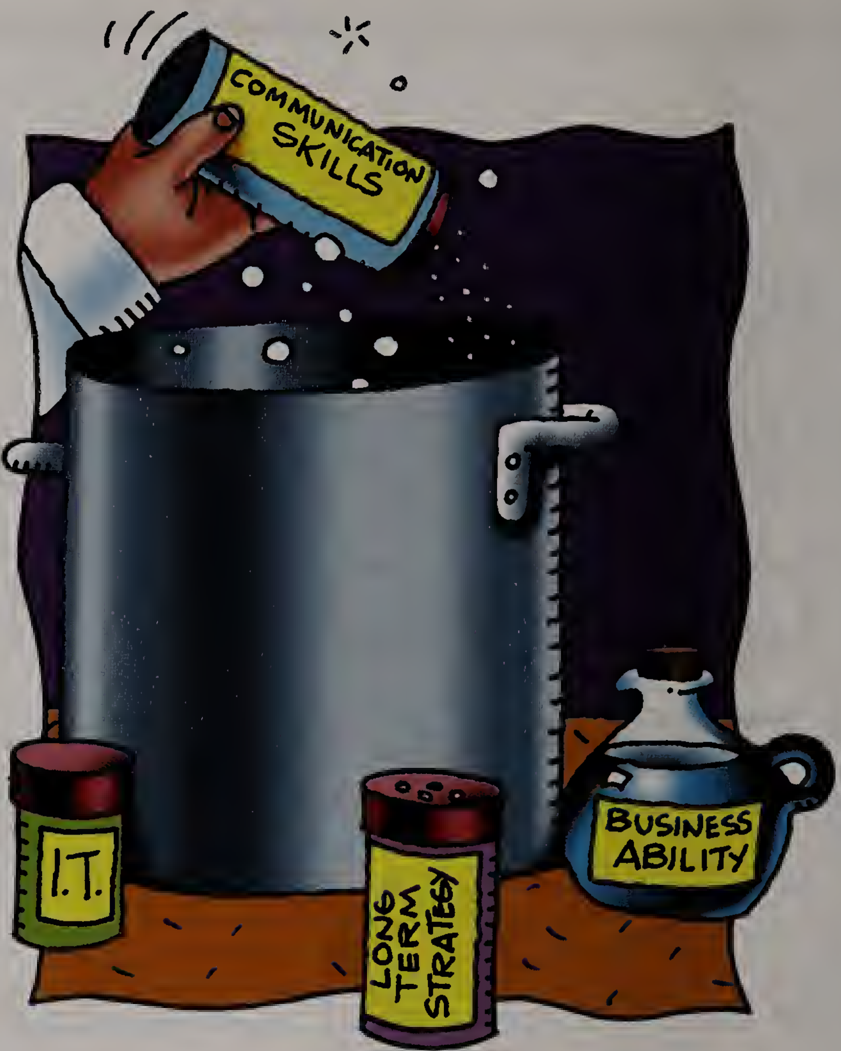
Mix in some hands-on knowledge of IT, add a dash of sharp communication skills for investor relations and you've got the preferred recipe for CFOs at Fortune 1000 companies, according to a recent survey by the Financial Executives Institute and the recruiting firm Heidrick & Struggles International, both in Chicago. Responses came from 170 Fortune 1000 CEOs, two-thirds of whom head companies with revenues between $1 billion and $5 billion (see survey results, left).


Nonfinance Functions of a CFO

Most Important Qualities of a CFO

Perceived Weaknesses of a CFO

NOTE: MULTIPLE RESPONSES ALLOWED
SOURCE: HEIDRICK & STRUGGLES



Increasingly, new CEOs are choosing their own CFOs when they assume the top job, according to the survey. Nearly all the CEOs said they see their CFO as a strategic business partner who engages in long-term planning and resolves business problems unrelated to finance. Two-thirds of the CEOs included managing corporate IS as one of the CFO's strategic roles. "Whether they manage the IS function or not, CFOs need a knowledge of how IS relates to the whole business process, and the sharper CFOs will continually update [their skills] and have a pretty close relationship with the CIO," says **Rucker McCarty,** who leads Heidrick & Struggles' CFO practice in Atlanta.

But the rise of the CFO's profile is a double-edged sword: Star performers can expect more promising careers, but bean counters could be asked to move on. "Since business has been good lately, a lot of companies have upgraded their CFO, thinking perhaps it's time to get someone even better to reflect the position of where the company is now," McCarty says. At the same time, he adds, "we're seeing a lot of CFOs move into the top position" at their company or another. As a result, the tenure of CFOs has shortened to between three and five years.

CFOs take note: If you don't want to be a CFO with all the extras, you may end up being a CFO "to go." *–Gary Abramson*

ILLUSTRATION BY KEN BOWSER

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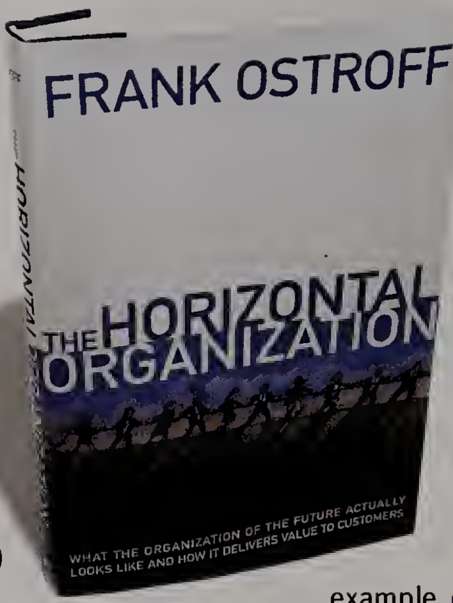
Executive Library

The Incredible Flatness of Being


FRANK OSTROFF
THE HORIZONTAL ORGANIZATION
WHAT THE ORGANIZATION OF THE FUTURE ACTUALLY LOOKS LIKE AND HOW IT DELIVERS VALUE TO CUSTOMERS

The Horizontal Organization
By Frank Ostroff
Oxford University Press, 1999, $27.50

WHEN THE HOME FINANCE DIVISION (HFD) of Barclays Bank conducted market research, it found that moving ranked just behind death and divorce in terms of stress. To relieve customers from some of the anxiety that accompanies home-buying, Barclays' HFD concentrated on delivering end-to-end mortgage services. Today, in addition to traditional mortgage offerings, Barclays' HFD customers can get legal and relocation assistance.

The market research Barclays' HFD conducted led to more than the creation of innovative product offerings. To actually provide such products, the division reorganized itself as a fast-moving, cross-functional entity comprising teams grouped by region rather than by functions. In *The Horizontal Organization*, **Frank Ostroff** uses Barclays' HFD and other examples to argue compellingly against the vertical, function-based orientations that exist in most businesses. While Ostroff acknowledges that vertical organizations can and do perform well, he insists that horizontal organizations work better. Where function-based companies experience fragmented processes, overspecialization and top-down control, horizontal companies boast of the ability to respond fast to market forces, empowered and committed employees, and improved productivity.

Using case studies of organizations such as Xerox Corp., the Occupational Safety and Health Administration, and Ford Motor Co., Ostroff elaborates on the nuances of horizontal organizations. For example, each of the aforementioned organizations still clings to vestiges of its function-based heritage to one degree or another. At Xerox, for example, the chief executive is the final arbiter of strategic decisions made by every business group. And though the organizations Ostroff profiles embrace the horizontal concept in different ways, there are shared characteristics: Teams constitute the fundamental operating unit, and process owners (either a team or an individual) are responsible for an entire core process. Above all, horizontal organizations focus on customers—internal metrics have no relevance unless they contribute to the "value proposition" delivered to customers.

In the quest for flatness Ostroff considers information technology central yet largely supportive. When implemented correctly, Ostroff argues, IT should accommodate a more horizontal structure by making information available on a real-time basis, supplying tools to identify and track problems, creating best-practice knowledge bases and enabling effective collaboration. In and of itself, writes Ostroff, IT will not engender an intense customer focus if business processes are not organized accordingly.

Books about reorganizing businesses into flatter, less bureaucratic animals abound. But Ostroff's book is refreshing because of front-line, firsthand employee accounts. At a General Electric plant in Salisbury, N.C., for example, automated equipment operator Harold Driver tells how teams must often train new managers in coaching and listening skills.

Ostroff is also brutally candid about the difficulty of transitioning to a more horizontal structure. The real challenge is to convince employees that they can personally benefit from the change. Getting employees to do that is always a task of Herculean proportions. While Ostroff presents visions of what organizations can be like once they become horizontal, he offers no specific prescriptions for winning the hearts and minds of employees. Perhaps a complementary book to this one is Dale Carnegie's *How to Win Friends and Influence People*. *–Megan Santosus*

Comic Relief

"I wish I had paid attention in that island leadership class."

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Don't Shoot the Messenger

Widespread panic about Internet fraud ignores common sense

BY MEGAN SANTOSUS

On Oct. 28, 1998, the Securities and Exchange Commission announced an unprecedented, nationwide bust. The focus of the high-profile sweep was 44 companies and an assortment of culprits who defrauded investors over the Internet. While the SEC's action was notable because it represented the first attack on Internet-based rip-offs, the publicity surrounding it has contributed to hysteria about the Internet. And for legitimate businesses hoping to capitalize on the Internet's arguable strengths of convenience and ubiquity, any hysteria concerning the integrity of the Net is bad news.

Yes, the Internet is new and as such offers those intent on committing fraud a new outlet for doing so. (In fact, several of those busted in the October sweep have committed investment frauds the old-fashioned way in the past, either through the mail or by phone.) But for fraud to succeed, unwitting consumers must take the bait. In that respect, the Internet is no different from late-night infomercials, fast-talking telemarketers or too-good-to-be-true direct mail pitches. The SEC essentially busted violators for the same kind of scams they perpetrated in the real world, only the swindles had a virtual twist: phony or misleading stock offers or information purveyed through junk e-mail, online newsletters and Web sites.

But despite the similarities, Internet fraud garners a different kind of attention. On a regular basis, *The Wall Street Journal* prints a list of SEC violators in minuscule type often buried deep within its Money & Investing section. If stock fraud is such a dangerous thing, why is Internet stock fraud the only kind emblazoned across the front pages of Web sites and newspapers?

In such cases, the Internet is tainted more than the fraudulent acts themselves. It's a shame to portray the Internet as an omnipotent, somehow malignant force that will not only steal our privacy but rob us blind. As powerful as the Internet is, it doesn't have a mind of its own. Any violation of privacy or fraud that occurs online or otherwise requires the active participation of consumers. At a retail site, consumers have to submit their e-mail addresses and credit card numbers. At Web sites touting IPOs, consumers have to put faith in the prospectus of a company they may never have heard of. The Internet is no more or less devious than other means used by the unsavory to steal people's money. That message gets lost in all the hype about the Internet's Big Brother-like capabilities.

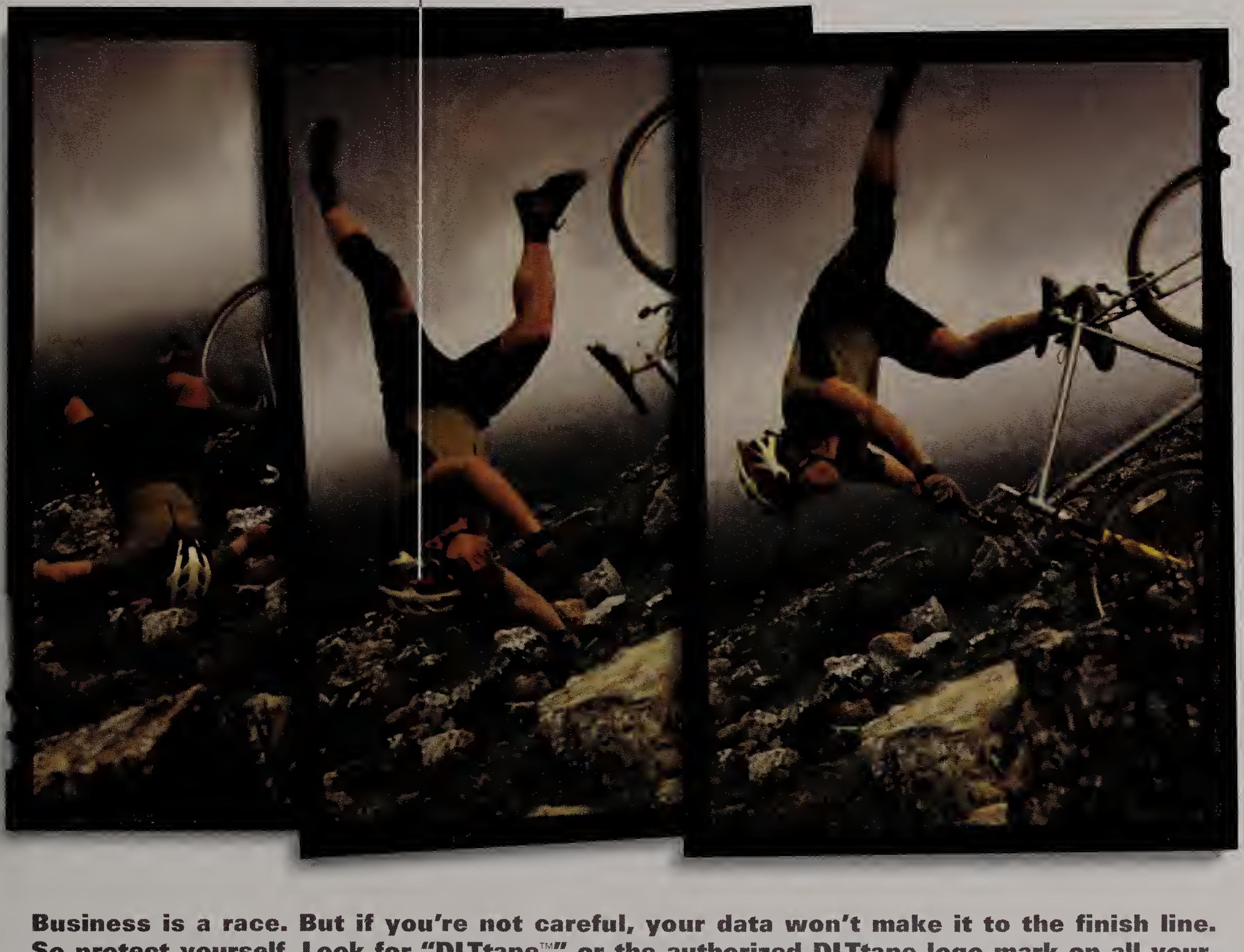
That's not to say that victims should be blamed. But a little due diligence on the part of consumers can go a long way in preventing fraud. In a press release posted on the SEC's site (*www.sec.gov*), Nancy M. Smith, director of the SEC's Office of Investor Education and Assistance, offers some sound advice: "Never, ever make an investment based solely on what you read in an online newsletter or Internet bulletin board, especially if the investment involves a small, thinly traded company that isn't well known. Assume that the information about these companies is not trustworthy unless you can prove otherwise through your own independent research."

In this respect, too, the Internet is no different from anything else where common sense and a little homework are the best defenses against getting taken. Executives charged with crafting an Internet strategy must remind their customers of this to avoid being shut out by the panic.

Senior Editor Megan Santosus can be reached at santosus@cio.com. *Send responses to this column or suggestions for future topics to* reality@cio.com.

ILLUSTRATION BY SCOTT MENCHIN

Protection from the inevitable



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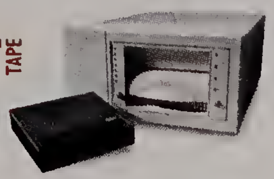

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A view to the future and a sense of Novartis's past help Joerg Staeheli shepherd knowledge management projects through the global corporation.

RPORATE BRAiN

Novartis ventures a new strategy for sharing ideas and innovation across a global enterprise

BY GARY ABRAMSON

From the rooftop of his office overlooking the Rhine, Joerg Staeheli can make you see history and with it the blessings—and the bane—of an intellectual empire. Follow his gaze into the foreground: Laboratories that have created some of the world's best-selling drugs and chemicals dot the banks of the Rhine. At this bend in the great river, where Basel grew from a medieval Swiss university town to a world-renowned center of science-based business, three countries meet. A few hundred yards to the north stands Germany, where science and business joined to create the chemical industry. To the east, so close you can see the French customs post, lies Alsace, a region conquered and reconquered by Germans and French. In today's global economy, employees of Staeheli's company cross these borders each day without a thought to politics. Panning the city itself, Staeheli points out the large, modern buildings that dominate Basel and that now belong to his company, Novartis AG.

Born of the merger in 1996 of two venerable Basel-based companies, Sandoz and Ciba-Geigy, Novartis is the newest and richest beneficiary of Basel's confluence of scientific learning, industry and culture. From two tiny makers of specialized dyestuffs 150 years ago, Novartis has become a $24 billion corporation that calls itself a "life sciences company," a conceptual catchall for an entity whose products include such diverse items as pharmaceuticals, genetically engineered seeds, baby food, contact lenses and animal health products.

Reader ROI

READ THIS PROFILE TO LEARN

- Ways to share useful concepts between dissimilar business units
- How to involve staff from many levels and locations in hands-on knowledge management
- The potential obstacles and benefits of knowledge sharing

Yet Novartis's breadth of products and its success in the global economy make for its greatest challenge: How can a company with extremely sophisticated and diverse knowledge—in basic technologies, scientific research, manufacturing and marketing—marshal its dispersed, compartmentalized intellectual resources? How can a company that depends on innovation to survive find ways not just to share but to increase its knowledge?

This problem faces any knowledge-intensive, global industry. Novartis addresses it with a three-pronged strategy: using Web-based technology to foster collaboration within its worldwide workforce; creating a system of development grants (think of in-house Fulbrights) for projects that will make different business units work together; and hosting periodic knowledge fairs to spark ideas. Staeheli, who heads this effort, prefers to call it knowledge networking, because that sounds less hierarchical than knowledge management (the usual term for a strategy to make the whole of a workforce's contribution greater than the sum of its individuals' knowledge). Likewise, Staeheli's title is "officer of the science boards." Senior officer of corporate knowledge management, the role he acknowledges to outsiders and which he in fact

PHOTOGRAPHY BY WILLY SPILLER

performs, would sound too much like he controlled the process, he says. He prefers to see himself as a shepherd rather than a director. The wording is more than symbolic. Novartis's president, Dan Vasella, asserts that knowledge transfer and creation will determine the company's future competitiveness. "Knowledge networking" shows that Novartis understands that making the most of an organization's intellectual assets is more of a cultural than a technological challenge.

Howdy, Stranger

Until he walks into the hotel conference room in Zurich, Switzerland, one Friday morning, Colombian chemist Esteban Pombo-Villar has never met Xun Wang, an American geneticist who looks like he has flown in from Southern California. Which he has. Thanks to Staeheli, the two Novartis colleagues are sitting across from each other—along with seven other company scientists—ready to engage in a totally new experiment in which they'll be the guinea pigs.

> **"You have to advertise, you have to promote like you would to sell a product on the market."**
>
> –JOERG STAEHELI

Staeheli, a soft-spoken but kinetic man, has selected a few dozen of Novartis's younger scientists and managers to become the company's first "technology scouts" in each of its business units worldwide. Their mission is to lead the charge at their home offices in search of promising, cutting-edge technologies and bring colleagues into worldwide, online brainstorming groups that will, hopefully, lead to the development and sharing of those technologies across business units.

The scientists begin haltingly. Like any group of strangers who must feel their way into becoming a unit, there are short comments to test the waters, until two or three daring individuals hold forth to set an early agenda. Bernhard Fischer from the generic drugs unit in Vienna brings up the idea of protein engineering, describing it as a technology that might enable a molecule to taste sweeter. So why can't this be used to make contact lenses biocompatible? asks Peter Hagmann, from the Ciba Vision contact lens company in Aschaffenburg, Germany, mulling over this new thought.

Rudolf Waditschatka, a process development chemist from the crop-protection unit in Muenchwilen, Switzerland, mentions a microtechnology that would "make chemical production a white-collar job" instead of the "dirty, smelly job" it is now. Hagmann and Wang say they have both read about it and wonder whether it might apply to their businesses.

In an hour, a mix of reserve and skepticism has turned into a mix of exuberance and skepticism (these are scientists, after all). The problem, they all agree, will quickly become how to keep the collaborative ball rolling once the face-to-face meetings end. "You could start off the online dialogues with a provocative statement," suggests Waditschatka. "We'll have to market the ideas—make them popular science," chimes in John Stokes, an Australian chemist now in management as a strategic planner.

Even among technology lovers in a technology-driven business, nobody doubts the next step—moving into what Staeheli calls "the virtual space"—will be the toughest. Collectively called The Knowledge MarketPlace, the applications include a corporate YellowPages of staff expertise, a BluePages of outside experts vetted by Novartis employees and The VirtualForum, which the scouts are being shown that morning, a virtual bulletin board and meeting room that will include the technology scouts' forum. But the problem is that only a couple hundred or so of Novartis's 86,000 employees have entered themselves into the YellowPages in its first few months. (That grew to over 700 by January 1999.) "I now have 35 names from the scouts' meeting, but that still doesn't tell me what technology you all cover," laments Peter Kondor, attending the meeting from the consumer health unit in Basel. In a day or two, the scouts will be back in their offices.

Even a great company needs to invent constantly just to hold its position, says Hanspeter Schelling, head of corporate knowledge management at Novartis.

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"We're under a lot of pressure to deliver, to be number one, to stay number one," says Novartis technology scout and chemist Esteban Pombo-Villar.

After much debate, they each agree to recruit at least one person from their own unit to join in the online technology discussions. But how many will really log on?

In-House Marketing

Staeheli is working hard to make sure scouts and recruits will participate. The afternoon before the formal meeting of the technology scouts, he seems a bit like the father of the groom before the wedding. He puts finishing touches on his presentation about the technology-scouting initiative, which he has dubbed FutureWatch with a marketer's ear for a catchy product name. He confers with an assistant who has put together shiny silver souvenir bags that participants will receive when they register. He asks for a critical eye on his welcome speech, concerned about his not-quite-perfect English, the lingua franca in this very Swiss and German company.

Though there is no mistaking Staeheli's training as a scientist—his speech is peppered with phrases like "proving the model"—it is equally obvious that he is a skilled salesman. "We consider [knowledge management] now as a product that can be used internally, and you have to advertise, you have to promote like you would to sell a product on the market," he explains.

In any month he can be found jetting around Europe or the United States to Novartis offices to promote his programs. At a 1998 meeting of some 250 of Novartis's top managers at Harvard Business School in Boston, Staeheli made a pitch for the Knowledge MarketPlace. Within a few months, he is readying a new VirtualForum based on a management tool called the balanced scorecard (see "Score It a Hit," *CIO* Section 2, Nov. 15, 1998). By spring 1999 the scorecard forum will join FutureWatch and a half-dozen or so other online topics including IT and business administration. Staeheli has even hired a Swiss public relations firm to help him get an article in a business paper that Novartis employees are likely to read.

Budgeting for Knowledge Transfer

This campaigning may sound superficial, but its objective—ensuring the success of knowledge sharing—is critical to the future of Novartis. The company and its competitors are scrambling to put together portfolios of intellectual assets as a new life sciences industry evolves from a wave of mergers and acquisitions among drug, nutrition, seed and biotech companies. A handful of giants, including Novartis, are on the prowl to buy or ally with startups, and they compete for partnerships with individual outside scientists and academic institutions.

As multinational corporations accentuate the commercial side of the traditional exchange of knowledge among scientists, Staeheli must create channels for this knowledge to bubble up into Novartis products. Staeheli's senior partner in knowledge management, Hanspeter Schelling, is head of corporate knowledge management. Besides sitting on the Research Council of the Swiss National Science Foundation and serving

Science and the Art of Knowledge

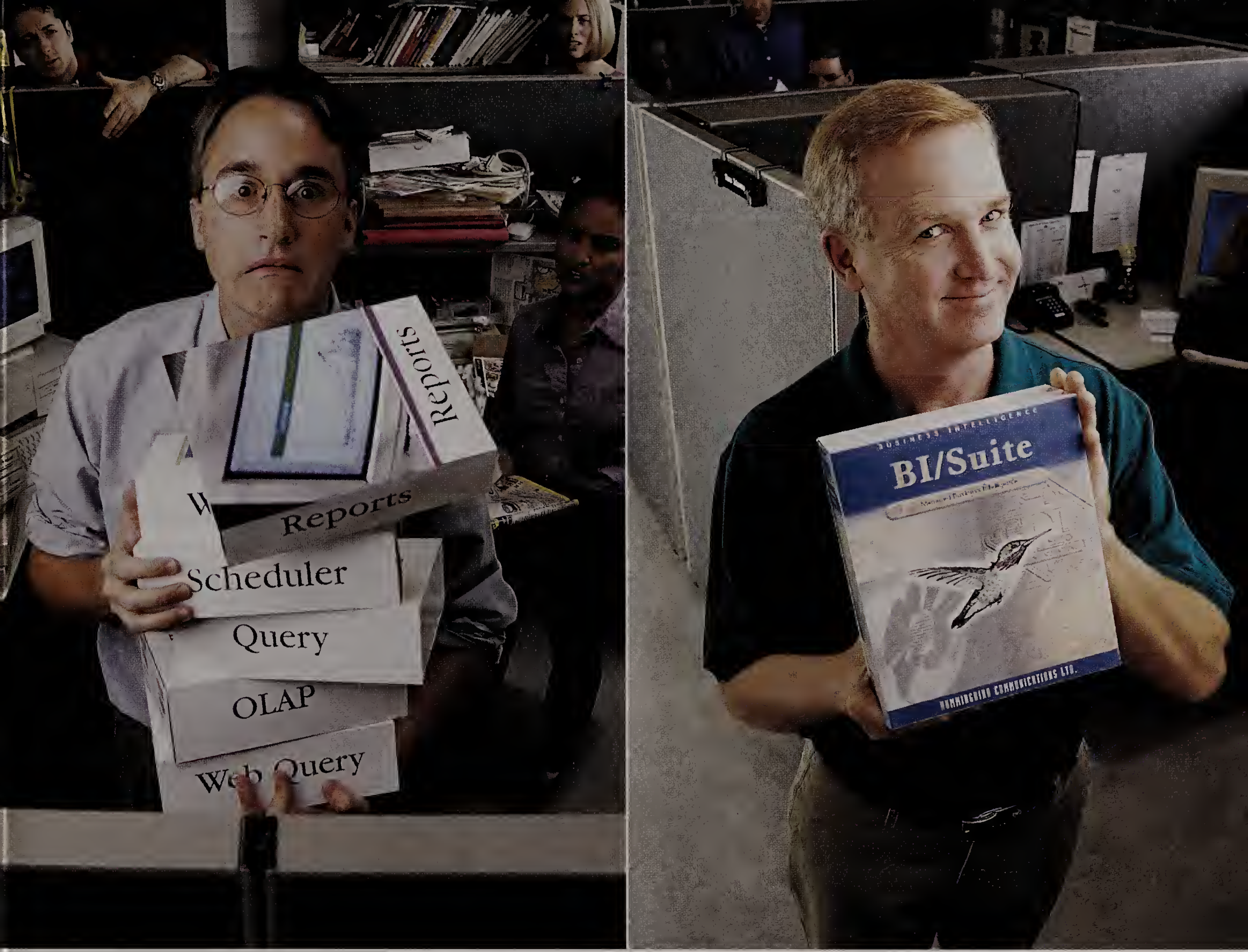
Pioneers on the knowledge frontier

MANY COMPANIES TALK ABOUT KNOWLEDGE AS A key asset, but the number that have actually jumped into practicing knowledge management—a field less than 6 years old—is not more than a few hundred out of thousands of corporations around the world. Global companies understand the logic, but until recently few were willing to risk time and resources on an unproven strategy. But science-based companies are leading a new wave.

"Senior management has now read enough about KM to say, 'How do we get this started?' We get calls from people who say, 'My competition is doing this,'" says Mark Mazzie, chief knowledge officer of Barnett International, a pharmaceutical industry consulting firm in Media, Pa. Companies such as Eli Lily and Co. of Indianapolis and Pfizer Inc. of New York City have begun to share their experiences at industry conferences.

However, even in an industry such as pharmaceuticals, management "doesn't know where to put new KM programs: in HR, strategy, IT, or even who in the organization should get it started," says Mazzie. "I've had CIOs say they understand KM, but it doesn't belong under IT. We normally recommend it be a standalone department reporting to a high-level [executive]."

–G. Abramson



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as a link to the outside scientific community, Schelling is responsible for the company's Research Advisory Board that funds several million dollars a year in high-risk research projects. The heads of research of all business sectors sit on the board, which approve about half of all proposals. Results of proposed projects must be applicable to more than one business unit.

Staeheli and Schelling hope that some of the ideas the technology scouts develop in virtual forums will inspire research proposals, which in turn can develop into new technologies for use inside Novartis or into new products or components. In fact, a group of scouts presented its first idea to the board, for a cooperative project on drug delivery techniques, within two months of FutureWatch's launch. Staeheli was headed to MIT this month to seek possible collaborators for the project.

> **"It's the kind of high-risk, high-return project that, normally, businessmen would be hesitant to do."**
>
> —JOHN MARTIN MANSER

But the scouts are only one source of research ideas, which all business units are encouraged to produce. Among the board's current research projects that may lead to commercial products is research in nutritional products to delay the onset of osteoporosis. The nutrition and pharmaceutical businesses are working together to explore ways of adapting the composition of normal foods to prevent the age-related weakening of bones. "I'm convinced there will be products on the market eventually that are based on this cross-sectorial project," Schelling says.

The board has already had successes. Novartis's treasurer, John Martin Manser, brought a suggestion to the Research Advisory Board on using artificial neural networks—computer programs that learn by recognizing patterns of data—for financial forecasting. The board is funding development of the application for Manser's finance department, but the chemical processes department is also expected to benefit.

To the Knowledge Fair

Manser got the idea for the neural networks project by attending one of the knowledge fairs that Staeheli and Schelling host about four times a year. The fairs, of which the scouts' FutureWatch was the most recent, are a rare opportunity for face-to-face, open-ended meetings of scientists and businesspeople from throughout Novartis. One scientist who works in veterinary research in a small Swiss town said the one-day events keep him from feeling isolated from the rest of the Novartis scientific community. Recent topics have included product delivery systems, high-throughput screening and functional genomics.

"To me it was amazing to find that people in such different disciplines have exactly the same structural needs, the same key success factors, and the means to be good are pretty similar," Manser says. Just as a Novartis scientist would, he listened carefully to discussions about neural networks, then made a pitch for research to the Science Board. "It's the kind of high-risk, high-return project that, normally, businessmen would be hesitant to do because of the risk of failure," he explains. But if it works, he says, it could improve financial forecasting for the management of Novartis's $14 billion investment portfolio.

Leaders of knowledge programs know that unless employees believe that such apparently fuzzy programs have the endorsement of top management, they won't participate. To convince the scouts to devote time to the new knowledge-sharing project despite pressures the merger has brought, Staeheli brings his boss, Hans Kindler, head of group technology and a member of the Novartis eight-member executive committee, to rub elbows with the scientists the night before their first meeting and emphasize his sponsorship of the project.

Stumbling in Virtual Space

The real work for the scouts begins once the forums go live about 10 days later. Back in her office in Basel, technology scout Karen Ann Bergmann wonders whether the pressures of the daily routine will leave room for the forums. Bergmann, who heads strategic planning for technical research and development, was impressed by the proposals she heard that had overlap across business units. "This was a big eye-opener. But I think it will be really difficult. Today we got the information to start the database, but I was struggling to find the energy and focus to enter and see what others had posted. I'm back in the office and doing what I have to do [for my daily job]. It's easy when we're isolated in a room together."

Three months after the FutureWatch launch, the experiment has moved into a new phase, and Novartis is absorbing the lessons. As Bergmann feared, the online participation did in fact die down twice. Each time, Staeheli and other moderators prodded more postings with a round of e-mails and online responses to keep debate flowing. "We learned you have to continuously feed oil into the furnace, challenging people to come back," or the energy disappears, Staeheli acknowledges.

But all told, the knowledge shepherd sounds encouraged. The scouts and their colleagues created about 60 topics for discussion, while the VirtualForum as a whole has drawn some 350 comments. This spring the scouts will be welcomed back to the virtual space with new topics, which Staeheli says this time will be more narrowly focused. But the inherent fuzziness of knowledge sharing is not something to avoid. At a company like Novartis, it's essential. "I got a typical comment this morning from a person who made a good contribution," Staeheli recounts a few days after the scouts' launch. "[The scout] told me 'I'm not completely informed about the technical details I'm talking about.' I said, 'That qualifies for the platform because if everyone knew the technology then this wouldn't be interesting; there should be an uncertainty as to whether it will work.'" Staeheli's voice cannot conceal his excitement: "That is the attitude I like, because we are reaching far out."

Senior Writer Gary Abramson can be reached via e-mail at gabramson@cio.com.

Knowledge Management Question #2

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Needs Improvement

Top business schools are struggling to integrate technology across their curricula

BY CAROL HILDEBRAND

When it comes to teaching our future business leaders to wield technology as a strategic weapon, big-name business schools would do well to steal a page from the notes of Bentley College, a scrappy commuter school in the suburbs of Boston. Unlike the MBA programs at the so-called elite institutions, Bentley's Information Age MBA program won't award a degree to students who don't complete a course in the strategic use of information technology. And that's just for starters.

Why do giants like Harvard and Wharton lag in an area widely perceived as vital to the success of Information Age businesses? After all, to keep up with the rapid pace of global change, any aspiring titan of industry needs to know how to grow the business through technology. "There's no question that you need to learn to do this," says Thomas Moloney, CFO at John Hancock Mutual Life Insurance Co., the Boston-based insurance company. "It's going to drive a lot of what businesspeople think about, not only in the United States, but internationally."

So how does Moloney, whose company recruits from all

Reader ROI

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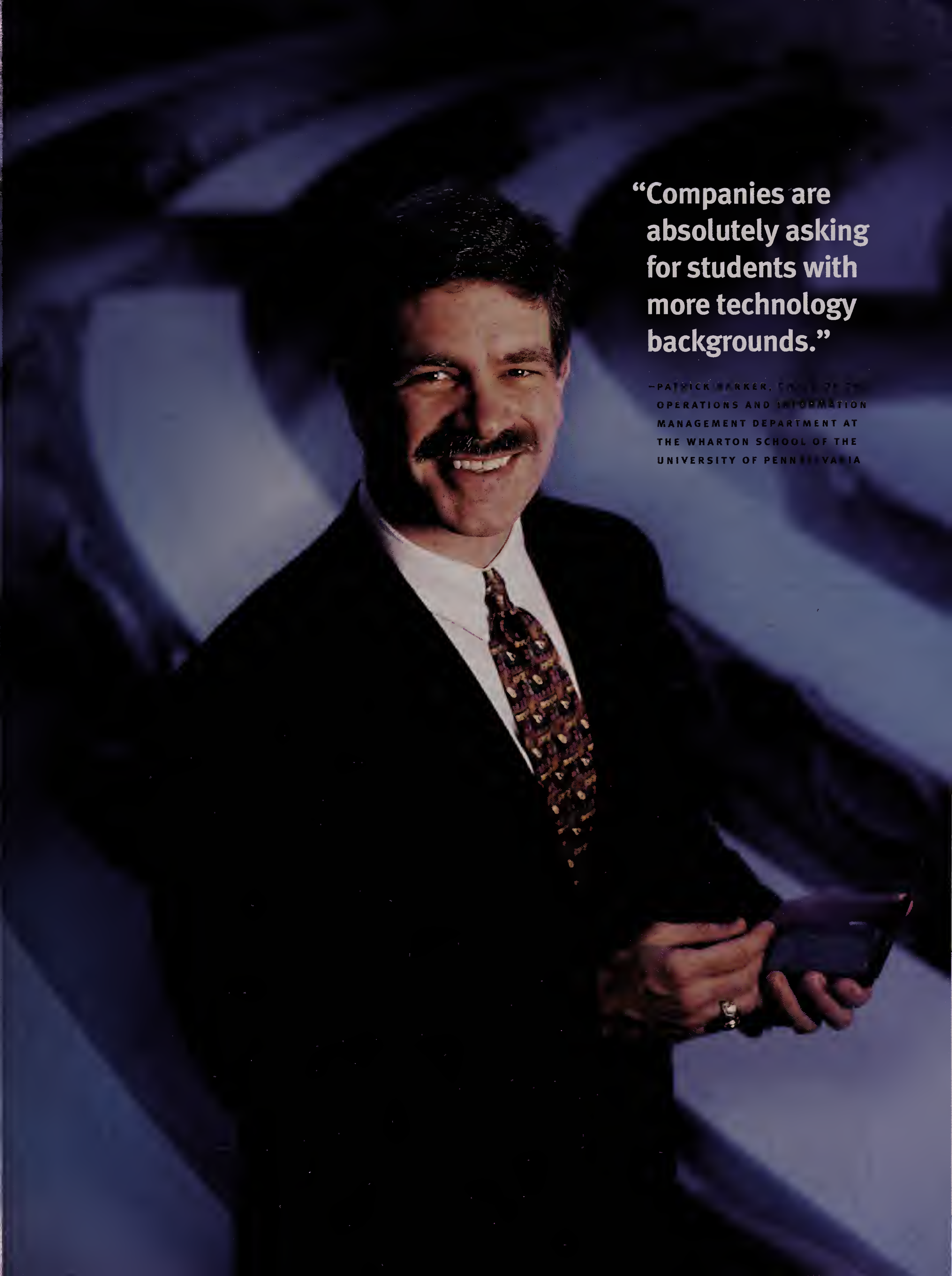
- Why businesses need MBA grads who can think strategically about technology
- Why technology should be taught across functional areas
- Why schools fail to integrate technology in their MBA programs

PHOTO BY ED WHEELER



“Companies are absolutely asking for students with more technology backgrounds.”

—PATRICK HARKER, CHAIR OF THE OPERATIONS AND INFORMATION MANAGEMENT DEPARTMENT AT THE WHARTON SCHOOL OF THE UNIVERSITY OF PENNSYLVANIA the prestigious business schools, rate their graduates' IT ability? "They've got a long way to go," he says. "[Strategic IT classes] ought to be a requirement."

And yet, they're not. We talked to the top 10 schools in *Business Week*'s 1998 MBA issue (see "Heavy Hitters," below). While deans and professors at these schools all acknowledge the importance of technology education in their MBA programs, none has an established method of teaching students—presumably the CEOs of tomorrow—how to make wise decisions about IT. A host of problems, ranging from faculty foot-dragging to finding personnel qualified to teach strategic IT courses, prevent the schools from offering a comprehensive and integrated view of strategic technology and business issues. It's certainly possible for students at top-tier schools to learn a great deal about the strategic use of information and information technology. But it's also possible to walk out the doors without taking one course on the subject, and many do.

How to teach technology appropriately "is probably one of the most important questions that schools wrestle with today," says Joel Huber, associate dean of the MBA program at Duke

Heavy Hitters

The top 10 MBA programs

1. **University of Pennsylvania (Wharton)**
2. **Northwestern University (Kellogg)**
3. **University of Chicago**
4. **University of Michigan**
5. **Harvard University**
6. **Columbia University**
7. **Duke University (Fuqua)**
8. **Cornell University (Johnson)**
9. **Stanford University**
10. **Dartmouth College (Tuck)**

SOURCE: *BUSINESS WEEK*, OCT. 19, 1998

Bucking Tradition

A little school turns the traditional MBA program on its head

FOR BENTLEY COLLEGE, THE INFORMATION REVOLUTION LOOKS LIKE GOOD business. And boy, is it investing. The school has announced a brand-new Information Age MBA program for fall 1999. And the program is backed by a $20 million building, the Smith Academic Technology Center, for which the school broke ground last fall. Joseph G. Morone, president of the Waltham, Mass., college, says the new program is a logical extension of the changes driving business today. According to Morone, the core business practices of marketing, product development, finance, accounting, operations and even business communications are being profoundly altered by the Information Age—which he defines as a convergence of essentially unlimited computing, communications and data. "The result," he says, "is an overwhelming and largely unmet market need for technologically savvy business professionals and business-savvy technology professionals."

Bentley's program chucks the traditional yearlong required courses in business basics such as accounting, finance, marketing and strategy and boils them down into a single yearlong course called Integrated Business Fundamentals. In their place, the school adds a slew of required courses such as Information Technology for Competitive Advantage, Data Collection, Analysis and Management, Team Effectiveness and Leadership Effectiveness. (See "Required Courses for Bentley's Information Age MBA," right.) And all courses will have technology threaded throughout, both in the curriculum content and in the way it is taught. For instance, students will do coursework for several classes on an SAP system, the monolithic business software that integrates business functions from soup to nuts. By the time they graduate, students won't just know about business technology, they'll know how to use it.

Required Courses for Bentley's Information Age MBA

FIRST YEAR

- Integrated Business Fundamentals
- Business Processes
- Information Technology for Competitive Advantage
- Data Collection, Analysis and Management
- Leadership Effectiveness: Theory and Skills
- Team Effectiveness: Theory and Skills

SECOND YEAR

- Global Strategy
- Customer-Focused Management for Competitive Advantage
- Knowledge Management I
- Knowledge Management II
- Management Consulting Teams
- Electives (4)

The school hatched the program after pulling advice from an advisory panel made up of senior executives from 13 diverse companies as well as from an interdisciplinary faculty team. The more they talked, says Patricia Flynn, the dean of the Bentley College Graduate School of Business, the more the group recognized that an MBA born of the Information Age ought to concentrate on how the right information gets funneled to the right people so that businesses can make informed decisions. The group realized that the traditional functional concentrations, such as marketing and accounting, actually hindered rather than helped accomplish

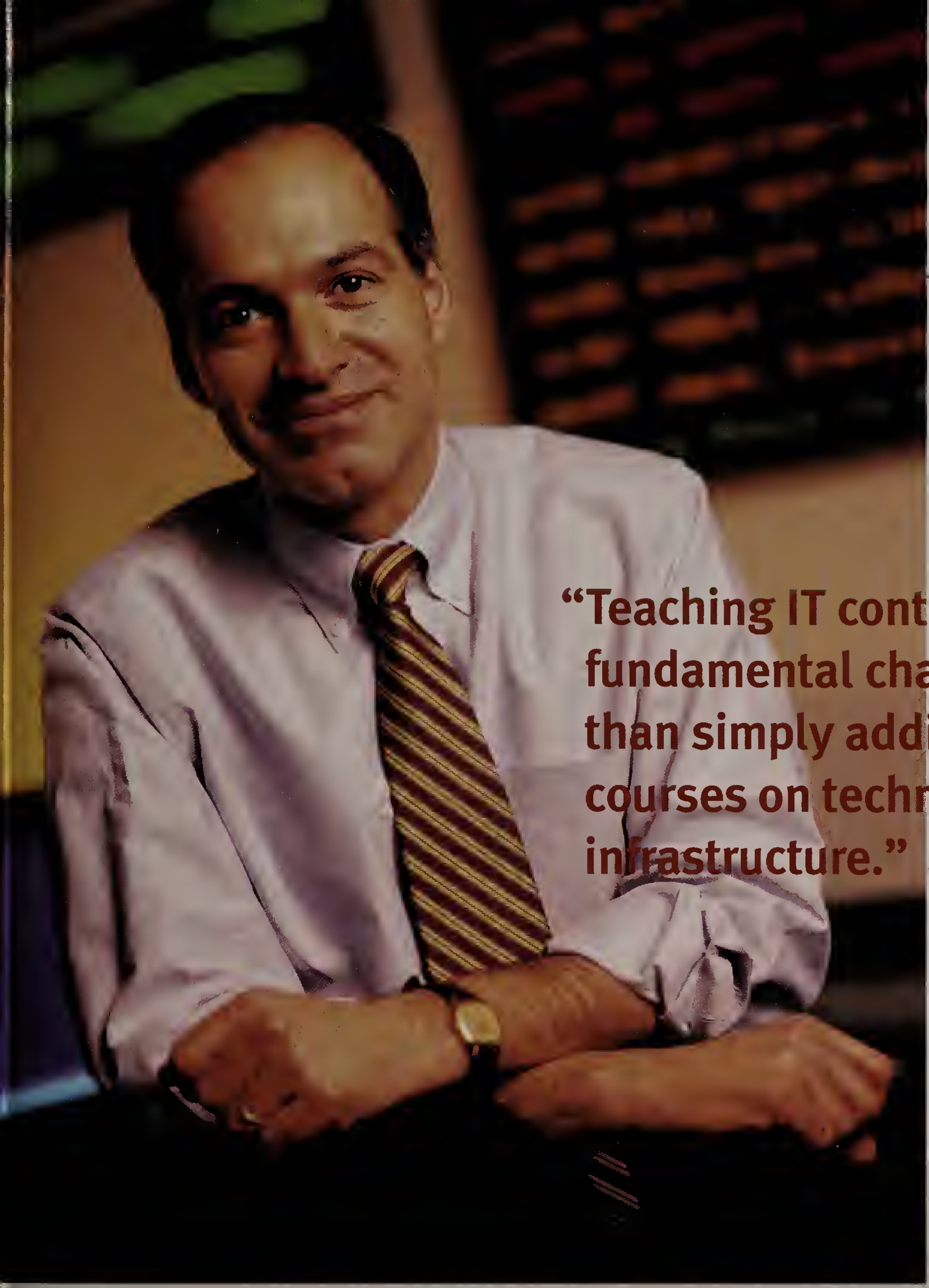


PHOTO BY FURNALD/GRAY

> **"Teaching IT content involves much more fundamental change to business curricula than simply adding a few specialized courses on technology or building an IT infrastructure."** –JOSEPH MORONE, BENTLEY COLLEGE PRESIDENT

this goal. "Instead of thinking of organizations in terms of discrete groups and divisions, we had to think about how information cut across everything," she says.

Concentrating on information flow also meant combining business and technology education, says Morone. "Higher education has created parallel cultures—one for business, the other for technology. The challenge is to break through these cultural smokestacks and infuse technology into the core business curriculum."

–C. Hildebrand

University's Fuqua School of Business. Huber and other administrators are beginning to feel some pressure from the companies that hire their graduates. "Companies are absolutely asking for students with more technology backgrounds," says Patrick Harker, who chairs the operations and information management department at the Wharton School of the University of Pennsylvania. He cites companies such as Charles Schwab & Co. Inc. and Citicorp and consultancies like McKinsey & Co. as examples. And students are equally eager. "They're screaming for the stuff," says Eric Clemons, a professor of operations and information management at Wharton. But as every toddler knows, screaming doesn't always get you what you want.

"As a general manager, I would have liked to have seen more options for courses regarding the strategic use of technology in business," says Stacey Watson, a project manager at Harley-Davidson Inc. and a recent graduate of Northwestern University's Kellogg School of Management.

Tool Only?

It's not that business schools fear technology. As a matter of fact, they bulge with the stuff. Over the past three years, for example, Harvard Business School has invested millions of dollars in hardware and software as part of Dean Kim Clark's IT overhaul (see "Wire Education," *CIO* Section 2, Oct. 1, 1998). Duke University's Fuqua School requires students to take a first-year course that teaches them to use applications like spreadsheets and databases, while Columbia University's Graduate School of Business brags that it was the first school to require students to buy laptops, a policy that's been in place for seven years. Students at all the top schools use their laptops to check school intranets, where they can do anything from registering for classes to reviewing class notes. Extensive e-mail systems let them work collaboratively, and many schools use e-mail and intranets to set up job interviews.

When technology is something students use daily, says Richard Highfield, the associate dean for MBA programs and operations at Cornell University's Johnson Graduate School of Management, "it becomes natural for them to start thinking about it in a business context." In this instance, familiarity is supposed to breed respect, which it may well do. But does using e-mail and an intranet qualify one to make strategic decisions about IT? That's like saying because your accountants in finance are superstars at using spreadsheets, they can give a thumbs-up or thumbs-down on a pricey e-commerce proposal. Bentley President Joseph G. Morone, who helped create the school's Information Age MBA, defines the problem as one of format versus content; in the case of business schools, all the laptops, databases and intranets are just the format, he says. "Teaching content involves much more fundamental change to business curricula than simply adding a few specialized courses on IT or building an IT infrastructure in which to teach," says Morone. "It involves reaching into the guts of the business curricula and changing what we teach. Not just how [form], but what [content]."

IT in the Mix

Most academics are quick to say that the content should be in the classroom. Many are trying to infuse technology education throughout the traditional functional areas, particularly in required first-year courses. For example, a marketing core class might touch on e-commerce; operations professors might teach supply chain technologies. Harvard, in fact, has stopped hiring professors that concentrate solely on technology, instead hiring IT-savvy functional professors. "My guess is that IT faculty at Harvard won't exist in 5 to 10 years. They'll all be out in the functions," says Steven Wheelwright, the MBA program chair at the Cambridge, Mass.-based school. As Gautam Kaul, an associate dean at the University of Michigan Business School says, "Technology falls within the rubric of everyday business, and everybody needs to know about it. You can't deal with something so comprehensive by separating it out."

Business schools are on the warpath for IT-savvy professors, partly to shake up the status quo.

However, schools must first overcome a host of bureaucratic, academic and conceptual difficulties when integrating technology education into core courses. None of them has succeeded in solving all the difficulties inherent in this task, and most admit to a spotty success rate.

For example, deans can ask faculty to add technology content and stress the importance of doing so, but they can't issue a schoolwide edict with any confidence of success. The tenure system forces academic administrators to use the carrot method to manage change rather than the more forceful stick. Says one professor at a top 10 business school, "The real high-level professors have no motivation to change. They say, 'Why do I have to bring in technology when I'm tenured?'" As a result, some courses—mostly those taught by younger, more technically proficient faculty members—bristle with IT content, while others show nary a prickle. "It's completely uneven, and there's no pattern," continues the professor. "A few professors are absolutely into it, but the vast majority can't be bothered."

George Parker, the director of Stanford University's MBA program, believes that his faculty's scholarly curiosity will lead them to teach cutting-edge business theory, which includes the IT revolution. Hence, he does not offer incentives. However, other schools have resorted to the ever-persuasive money lure to get faculty to learn and teach about technology. Harvard, for example, funds most technology-related research proposals, while Michigan is contemplating offering course-load reductions, fellowships and other monetary incentives.

But asking academics to keep up with technology trends on top of the changes in their areas of expertise is a tall order. "I throw out 40 percent of my coursework every year and bring in new components every week," says Anthony Paoni, a professor of information technology at Kellogg. "Some professors think I'm nuts." That's a rate of change that's difficult for most teachers to sustain, particularly when technology is not their primary concern.

Wanted: Strategic IT Thinking

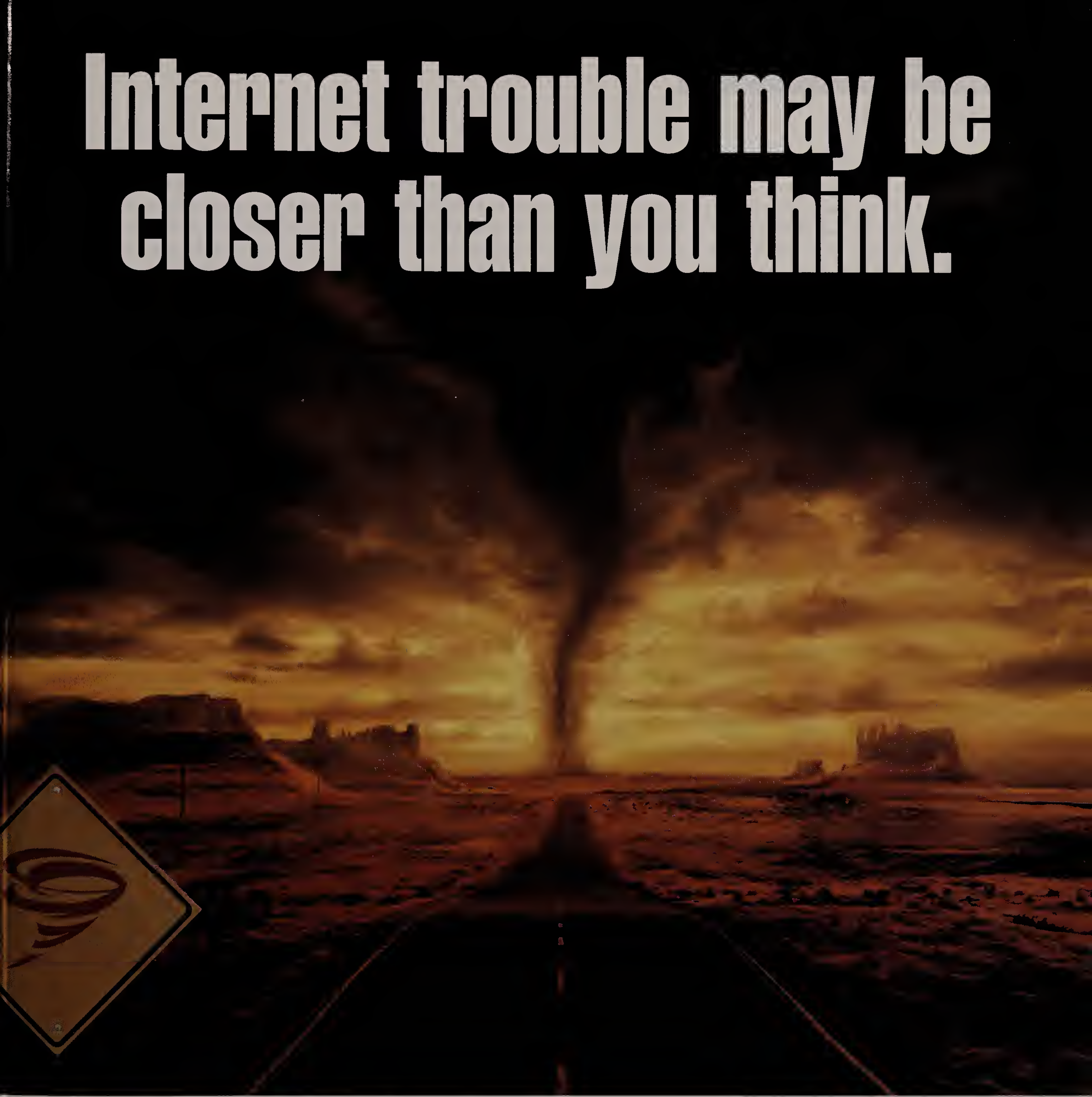
Even if a school manages to produce a core curriculum that integrates technology education evenly, students end up learning function-specific technology, which produces a smokestack effect.

Consequently, many students miss the unifying, vital piece of the IT puzzle: how to think strategically about technology across a company—an essential business skill for Information Age managers. "Technology strategies don't develop in a silo," points out Janice Morris-Hatch, a senior vice president of human resources at Fidelity Investments in Boston. "They have to go across organizations and functions." Morris-Hatch, whose company recruits from all the top business schools, would like to see a class that shows how technology intricately links each business function. She thinks all executives need to understand the links. "I'm not a technologist, but I still need to know this stuff," she says. (For more on executive education, see "School Choice," Page 50.)

Kellogg's Dean Donald P. Jacobs acknowledges the danger of function-specific IT education. "Each of our functional areas has people that spend a large part of their time thinking about the use of technology, but it's specific to their area. They're not pushing the pure strategic use of technology," he admits.

And Philip Anderson, a professor who specializes in technology at Dartmouth College's Tuck School of Business, says the school has heard about the need for strategic IT courses from the most convincing of sources. "We found out from alumni that people weren't prepared to go into industry."

Unfortunately, this area is where the top 10 schools deliver least. Not one requires their students to take a strategic IT course; instead, such classes are offered as electives. In fact, they're consistently among the most popular electives offered at many of the schools. Even the University of Chicago Graduate School of Business's class in strategic IT, which began only in winter



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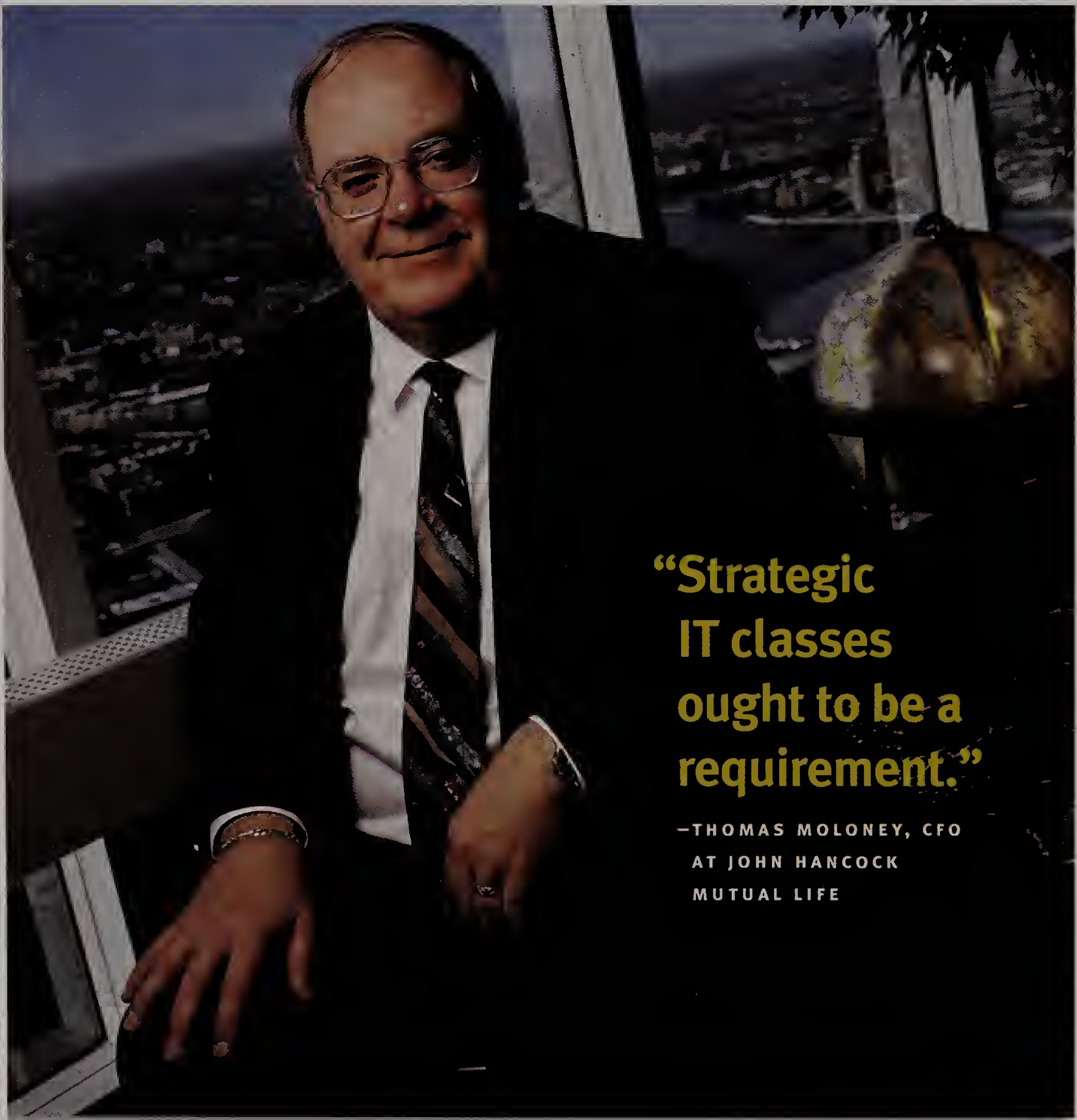
1999, is oversubscribed, says professor Toby Stuart.

Given their popularity and the increasing importance of IT's role in business strategy, why aren't these courses required? Some say students can learn all they need to know about strategy by taking a general strategy course, which is required in most schools. Many of the decision-making models taught in that course are transferable to technology decisions, says Stuart. "It's no different than making a decision about anything else," he says. Alison Churchill, a product development manager at Nike Inc. in Beaverton, Ore., and '97 graduate of Duke's MBA program, agrees, saying that her MBA gave her the tools to analyze and evaluate business problems. Technology, she says, "is just another problem." And Michigan's Kaul says the strategic technology courses offered by his school's computer information systems department "aren't the most important part of an MBA education, because these kids will start out in the middle" of an organization.



"Strategic IT classes ought to be a requirement."

—THOMAS MOLONEY, CFO AT JOHN HANCOCK MUTUAL LIFE

PHOTO BY WEBB CHAPPELL

But if newly minted MBAs won't need strategic thinking immediately, why is traditional business strategy almost always a required course? The sooner executives start thinking about technology strategically, the sooner they can apply what they learn. It seems unrealistic to expect them to be able to think wisely about technology once they ascend the corporate ladder if they haven't been doing so all the way up.

Bentley's Morone points out that students lose when schools try to make strategy classes a one-size-fits-all proposition. "Traditional strategic issues are very different from those of information-intensive industries," he says. He cites the problem of scaling up a manufacturing business—an all-consuming issue involving huge capital outlays. But scaling up in an information-intensive industry is "almost an afterthought," he says. "All the attendant issues associated with the startup of a manufacturing operation aren't really pertinent. The premium in building sustainable advantage shifts profoundly—away from physical assets and toward intellectual assets. In the process, our most basic notions of strategy, and of how to build sustainable competitive advantage, need to be examined and modified."

Faculty Resistance

Academics who specialize in IT also sometimes run into the "not invented here" syndrome from other functions and administrators, which may explain why these courses remain electives. Clemons, a Wharton IT professor, says that "if we had not pushed, nobody would have noticed" that there was a demand for his courses. He tells the story of how his first course in information economics started. "In the beginning, the administration was opposed to this class," he says. "They weren't hostile. They just didn't believe there was a need. I was told that I'd never get class attendance over 35," he says. "We currently teach seven sections, and they are all peaked out in attendance." Wharton's administration now completely supports Clemons' efforts; the Operations and Information Management Department currently has two newly hired professors helping Clemons teach and is searching for a third.

But hiring IT-savvy professors is no easy task. Without a doubt, business schools are on the hiring warpath for such professors, partly to shake up the status quo. "We hope the younger professors will infuse some of the old fogies around here with new ideas," says Wharton's Harker. However, the market for business professors with technical know-how is spectacularly tight, says Clemons. Kellogg even has an endowed chair in strategic information technology that it cannot fill, says Jacobs, Kellogg's dean. Small wonder: Academic pay looks ghostly in comparison to the healthy salaries technology companies and consultancies offer.

Fighting Back

Schools have invented some interesting coping strategies, such as importing professors from industry. Stanford University's Graduate School of Business, for example, offers a hugely popular elective in the strategic use of technology. Its teacher—Andy Grove, Intel Corp. chairman—may have something to do with its popularity. And Wharton is trying to grow its own IT-smart faculty. This fall the school will begin a program that offers those with a PhD in computer sciences a two-year course in business issues. "Basically, we'll teach them how to be business school faculty," says Harker. "We'll be creating a whole new generation of faculty."

This new generation of faculty may run afoul of the entrenched academic advancement system, however. To teach technology well you have to be out in the business world, talking to practitioners and learning from industry experts, says Tuck's Anderson. "I think the real cutting-edge people are typically in the technology industry, or they're venture capitalists or security analysts," he says.

But teachers must publish research to advance professionally, and real-world practitioner studies rate low on the prestige scale in academic publishing. "For the peer-review tenure context, there's a tendency to look for skills that have some timelessness to them," muses Duke's Joel Huber. "Because of that, it's more difficult to do research about something that is very current." The school does want teachers to "be wise about what's going on today, but that's probably not what we incent directly, and that may be wrong," he says. Compounding the problem is that by the time academic technology research gets published, which can take up to a year, it's dated.

Many businesses today struggle with the changes wrought by the Information Age. Schools have the double challenge of not only adapting to the changes institutionally but teaching those changes as well. And designing and implementing programs that reflect the new reality of business is undoubtedly difficult in an environment as steeped in tradition as academia. But while administrators at the top schools debate how best to enhance the role of IT in their offerings, others are perhaps acting more swiftly. "Competitors we've never heard of before are the ones who will make the changes," says Kaul, of Michigan's Business School. "We are convinced there's no choice here. These changes will be made. The question is, Do you want to be the school that does it well?"

Because in the end, schools need to deliver a product—students—that satisfies their corporate customers. If they don't, well, we all know what dissatisfied customers are prone to do.

Senior Editor Carol Hildebrand can be reached at cjh@cio.com.

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Jasmine Whitbread, managing director for the Americas for Thomson ESG, says Stanford's six-and-a-half-week executive education program made it easier for her to explain the strategic uses of IT to her clients.

SCHOOL CHOICE

BY PERRY GLASSER

Looking for a good dose of strategic technology in an executive education program? Better shop around.

A TRAVEL-WEARY EXECUTIVE drops his luggage on a dorm room bed and settles into a chair. The executive, who is being groomed to be a CEO, is spending six weeks at a top university's general management program to gain more insight into the finance, sales, marketing and operations functions. The computer on the room's only desk is a reminder that the company chose this program because it puts IT at the center of strategic planning. He turns it on. The first screen displays a map of choices—assignments, a welcome from the dean, class schedules, dining arrangements. The executive clicks and clicks again, boring deeper into the school's intranet. He can easily download the latest research by the school's professors or a guide to the library's periodical collection. He wonders what would happen back at the home office if they introduced an intranet as fast and robust as this? Could new systems and new business models inspire new levels of speed and efficiency throughout the company? He wonders....

Reader ROI

READ THIS ARTICLE TO LEARN

- Which schools integrate the strategic uses of technology for business into their executive education programs
- Why some schools teach the strategic use of IT better than others
- How executives implement change in their organizations to reflect their technology education

Do executives going back to school always get inspired with new visions for the strategic uses of technology? Most schools that offer executive programs have several open enrollment programs, some aimed at executives about to assume the most senior positions, others aimed at executives about to assume command of a division, line of business or region and still others targeted toward executives who require a quick grounding in a specific managerial skill. And there's more. Got an acquisition coming up? Entering a new market? In many cases, the same schools that field several open enrollment classes will develop executive programs made to order (see "A Quick Fix," Page 56). But just as all university programs vary in strength of faculty and curricula in economics, management theory or finance, they also vary in the richness of their IT component. If you're considering a trip back to campus for a tuneup of your executive skills, you need to know that while the options for executive education are as diverse as the foods at a fine banquet, when it comes to serving up the strate-

PHOTO BY JOHN SOARES

gic uses of IT, some programs are more nourishing than others.

Zero-Calorie IT

Though the education program designed for top-rank executives at the Johnson School of Business at Cornell University in Ithaca, N.Y., is four weeks long, the school has "no standalone course about IT as a strategic tool," says Michael Hospetler, the associate dean for executive education. Hospetler describes the program as one that emphasizes leadership and strategic thinking for decision makers, and he sees no shortcoming in what Cornell offers because of the absence of IT on the menu. At Cornell, IT is understood to be a matter of connecting plug A to socket B. "We deal with IT at an operational level," says Hospetler. He believes it's sufficient that executive enrollees at Cornell "do a day focused on strategic opportunities to turn information into a strategic weapon." Internet sales channels? Strategic data mining? E-commerce? Intranets? Global electronic collaboration? More than a few people believe we are at the dawn of the Information Age, but Hospetler dismisses the thinking that puts IT at the center of corporate strategy. "I can't recall lots of telephone calls asking for such classes," he says. Cornell's $19,500 program ensures that all 40 of the attending executives will depart with a mind unsullied by notions of how technology is transforming global business.

Perhaps the absence of a strong IT component to the University of Chicago's top-tier executive program, the five-day Finance for Executives, is because the second oldest business school in the country's nondegree executive education programs date back only to 1996. The university that claims to be home to more Nobelists in Economics than any other leads with its strength: economics. "People are looking for analytical skills more than technology per se," says Stephen LaCivita, director of executive education for the Graduate School of Business. "We don't teach people to be technicians," he adds. LaCivita maintains that executives interested in the uses of IT in marketing, for example, should "go to consultants."

Ask the Expert

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Have a question about executive education? Now you can pose it to Karen Arden, associate dean for executive and leadership development at the University of Toyota. CIO'*s Ask the Expert Web series offers readers the chance to ask questions of industry leaders. From now until March 31, Arden will be available to offer tips and advice on executive education. E-mail her your questions at* **asktheexpert@cio.com.**

Deidra Wager, executive vice president of retail for Starbucks Coffee, enrolled in Harvard's top-tier executive education program and was impressed by the number of case studies that focused on IT.

PHOTO BY DAVIS FREEMAN

Evidently, for the customers Chicago has drawn so far, a zero-calorie IT diet is what they ordered. Chicago's executive students simply don't seem to miss a component in the strategic uses of IT—or they don't know they miss it. Chad T. Vincent, vice president for Asia-Pacific at Miller Brewing Co. in Milwaukee, was pleased with his Chicago experience and notes that he was not looking for training in IT strategic thinking. "The courses were about the strategic uses of finance—valuing companies, cash flow and balance sheets," he says. And Lester W. Hurst, principal vice president and general manager of North America Telecommunications for Bechtel Corp. in Frederick, Md., one of the world's largest global engineering and construction companies, also got what he expected. Reflecting on the program's lack of IT content, Hurst says, "The Internet is a source of information, not a tool." This might sound odd to any executive who ever sent e-mail, collaborated with workers thousands of miles away via a discussion base or has relied on automated sales force software to deliver up-to-the-minute information to field reps.

IT Power Meals

Unlike Chicago and Cornell, most executive education programs at least dole out a small portion of IT strategic thinking. Some programs offer short, highly focused courses, which may stand alone

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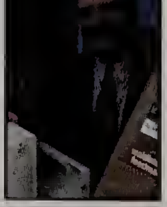

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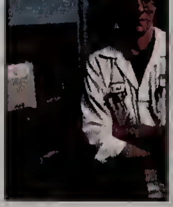

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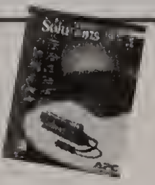

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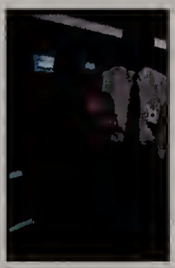

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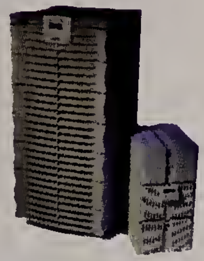

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or be offered as a component of a traditional general management program. These courses typically employ guest lecturers drawn from the business world, technology-related case studies and team-teaching that includes at least one professor who is an IT expert. The schools hope these IT-concentrated programs will pack a strategic technology wallop.

At Dartmouth College's Tuck School of Business, for example, the four-week top-tier executive program, General Manager Development Skills, includes a module called Industry Opportunities Through Network Technologies. In this module, "[Executives learn] how to read the horizon for such developments as e-commerce," says Marie Eiter, director of executive education at Dartmouth's Tuck School of Business in Hanover, N.H. Tuck also offers another IT-focused course, Strategic Revolution: Transforming Industries and Organizations, a week of study focusing on opportunities for growth, including mergers and acquisitions, leveraging a company's core competencies and maximizing the advantages of information.

Nancy Hall attended that program and returned to her job as a corporate planner for Texas Utilities Co. in Dallas, a $17 billion electric and natural gas, telecommunications and other energy-related services provider. She came away with a new understanding of how strong the Internet was in retail, manufacturing, customer information and other industries. The IT piece presented by professor Philip Anderson "was enlightenment, that's what it was. There isn't a meeting I go to now that I don't wonder, 'Where is IT in this conversation?'"

Selecting IT-rich case studies and team-teaching are the preferred means for preparing IT power meals in the strategic uses of information at the Kenan-Flagler Business School at the University of North Carolina (UNC) in Chapel Hill, where approximately half the school's executive education revenues come from customized programs. Albert H. Segars, associate professor of IT, says that at UNC "we [teach] IT as a resource to be managed, a way to find opportunities to employ technology for new business models." Collaborating with colleagues who teach business theory and practice, Segars develops scenarios so that students "won't want to keep IT in the box." When Segars is a member of a teaching team, he poses provocative questions that encourage executive students to imagine future business models. "What would it be like," asks Segars, for example, "to conduct business in an environment that had perfect voice recognition?" For a module on sales, Segars talks about how Ford Motor Co. is changing the entire selling process by using the Web and EDI. He asks his students to abandon thinking about how they must change IT systems to fit their company's structure. Rather, he invites them to think about how they must change their organizational frameworks to accommodate the potential of IT. "It's a resource, not a cost," he says, and with

A QUICK FIX

WORKING EXECUTIVES **load their backpacks and return to school for as many reasons as there are executives. Here are three leading drivers.**

1 **Their company partners with a university to create a customized program. Frequently, the company's goal is to prepare executives for a specific strategic move such as entering a new market, opening a new distribution channel or tackling a merger or acquisition.**

2 **Newly minted senior executives want to fill gaps in their experiential backgrounds. IT's role in strategic planning can feel like a missing molar—it's a small space but it feels like a canyon. "People are promoted up a chimney," says Marie Eiter, director of executive education at Dartmouth College's Tuck School of Business. "They've been rewarded for having the right answers. Executive education can teach them to ask the right questions [of colleagues and staff]." The one-week Strategic Uses of IT (SUIT) program at Stanford University, for example, is quick and highly focused.**

3 **Executives marked for the highest leadership positions need to learn more about three drivers of modern business—efficiencies made possible by technology, new markets and channels opened by the knowledge economy and the globalization of business. Top-tier general management programs can be as short as 3 weeks, as at the University of North Carolina, Chapel Hill, or as long as the 11 weeks required at Harvard University. The best programs not only teach about strategy and IT but totally immerse their students in an IT-rich environment where hands-on experience helps blend theory and practice.**

–P. Glasser

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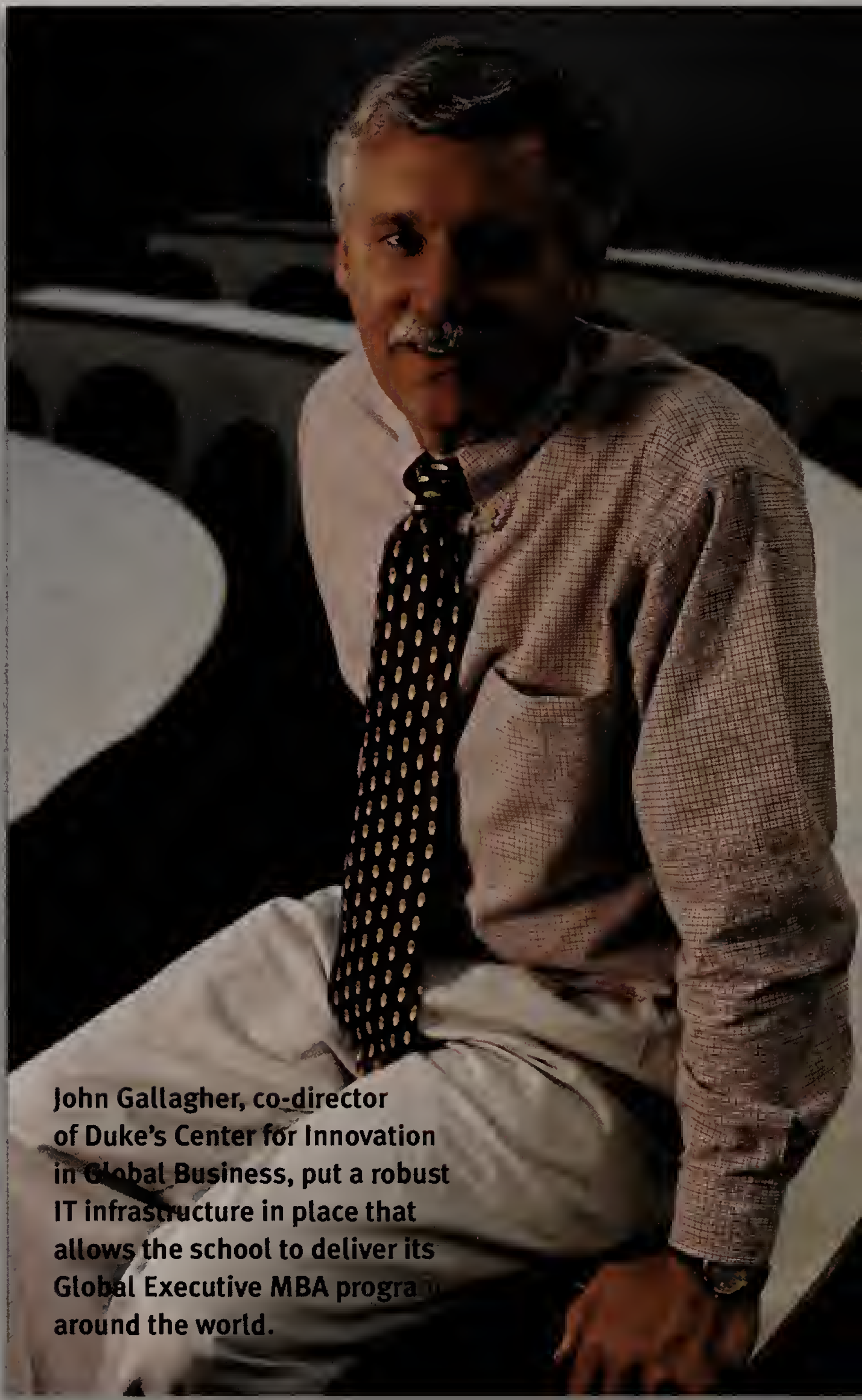
EXECUTIVE EDUCATION PROGRAMS



John Gallagher, co-director of Duke's Center for Innovation in Global Business, put a robust IT infrastructure in place that allows the school to deliver its Global Executive MBA program around the world.

PHOTO BY CHARLES REGISTER

a teacher's joy he adds, "It's great when you see the light go on."

Philip McCullough recalls the one-day session conducted by Segars that covered everything from e-commerce to knowledge management. McCullough, director of communications for the nonprofit Institute of Nuclear Power Operations in Atlanta, coordinates communications among his organization's representatives who must know the same information at the same time about constantly changing regulations and safety techniques. Following Segars' advice, McCullough is taking his technology thinking out of the box by preparing his people for digital technology developments that will have his road warriors accessing intranets filled with confidential up-to-the-minute news as easily as they now dial a cellular phone.

Many executive education programs draw guest lecturers from the ranks of nearby businesspeople, and if a school's location is an IT hotbed, the captains of IT industry are likely to show up in droves. At Stanford University in Palo Alto, Calif., executives flock to the week-long Strategic Uses of Information Technology (SUIT) program, which was championed and shaped by William F. Miller, former chairman of the board of Borland International Inc. Students in the program may hear from such IT luminaries as regular faculty member Andrew Grove of Intel Corp. or John Morgridge, former president and CEO of Cisco Systems Inc. Being a top program also helps draw big names—at Harvard University, Jim Barksdale, CEO of Netscape Communications Corp., has led executive classes.

Because of Stanford's location in Silicon Valley, "You can't avoid teaching about using IT strategically," says Haim Mendelson, who has taught IT strategy there for 10 years. Mendelson designed the SUIT program with Miller to cover four themes as follows:

- Productivity in information technology and information systems.
- Distributed computing.
- Business uses of national and global networks, such as the Internet.
- The role of information technologies in the global company.

About half of the enrollees are CIOs or their equivalent; the rest are usually first or second in command of a business unit.

Mendelson persuades executives to think of IT, strategy and enterprise organization as the three legs of a stool—you can't adjust one without adjusting the other two, and if you remove any one, the entire structure topples. Rinn Evans, CIO of United Memorial Hospital near Grand Rapids, Mich., learned a lot about the human side of business strategy from Mendelson's tripod. "Personally, it was the nontechnical stuff that was eye-opening to me," he says. Evans was in the middle of an MBA program at home when his employer packed him off to Stanford for a week. When he returned, he changed his graduate degree studies to include more material on business culture and organizational behaviors and how those two areas are intrinsically connected to IT systems, collaborative work tools and new strategic business opportunities created by technology. Scott Komar, CIO for Fresh Express Inc., the folks who package pre-cut vegetables in Salinas, Calif., had his eyes opened at Stanford by "deep discussions about IT alignment and integration for new businesses." Back on the job, Komar campaigned to modify the company's organizational structure to reflect the closeness of business and IT strategy. For example, several members of the IT department moved to Fresh Express' raw product manufacturing group and began reporting to business group project managers. A change that was meant to be temporary is now being considered by other executive managers as a "tour of duty" program where IT project managers and business project managers would rotate through various business and administrative groups to foster technology integration across the company. "It's been a good partnership," Komar says, because the change in the company's reporting structure has allowed IT and business alignment to succeed.

Jasmine Whitbread returned from Stanford's six-and-a-half-week executive program and was soon promoted to managing director for the Americas for Thomson ESG, a company within Thomson Financial, a $1 billion financial information and technology provider headquartered in Boston. After attending Mendelson's sessions in the SUIT program, Whitbread says the biggest thing she took away was a vocabulary and conceptual framework that makes it easier for her to explain the strategic uses of IT to her clients. For example, she has advised her clients—

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bankers and broker-dealers—that they can enhance profits by eliminating faxes, telexes and all data stored on paper. "We supply them with the connectivity that can save costs," Whitbread says.

In Harvard Business School's top-tier executive education program, the Advanced Management Program (AMP), the faculty always creates and selects case studies with one eye on the strategic importance of IT. F. Warren McFarlan, professor of business administration and senior associate dean at HBS, has been teaching IT strategy for decades. Over the years, McFarlan has created and used case studies on Dell Computer Corp. for insights about sales and marketing, Netscape versus Microsoft Corp. for wisdom about competition and strategy and Cisco's extranet strategy for partnering with suppliers and customer service. Deidra Wager, executive vice president of retail for Starbucks Coffee Corp. in Seattle, looked at 300 case studies during her 11-week enrollment in the AMP. Wager was impressed by how many case studies pushed IT to the front of students' minds. "Microsoft might be the focus of a case study when studying operations, then again while talking about IT. That's how relationships among business functions and IT become evident."

Full-Bodied IT

Wager recalls how on her first day at Harvard in April 1998, 160 executive students gathered in a lecture hall. "They asked how many of us regularly used the Internet for e-mail and such. Only 20 percent or so raised hands, but they told us that was an exponential increase over three years before when there were practically none. They forced us to become adept at using the very powerful computers in our rooms," she says with some glee. Her observation raises a point—to learn to imagine a future where IT is at the core of business strategy, do executives need to get their hands dirty?

Most schools can manage to present a star guest lecturer or two, and hiring a full-time professor with special research interest in IT helps enrich a school's executive curriculum. But to really deliver a powerful dose of IT strategic thinking, you must be at a school that has made an investment in a state-of-the art IT infrastructure—think of it as total immersion. The ideal setup can access not only all pertinent resources on campus but can tap into resources around the world by Internet, telephony and satellite communications. Theory, guest lecturers and case studies are great, but executives who get those and are immersed in an IT-rich environment learn to value the strategic uses of IT because of what they do in addition to what they study.

Finding It Online

Cornell University
www.gsm.cornell.edu/ExecEd/execdev.htm

Dartmouth College
www.dartmouth.edu/tuck/exec-ed/index.html

Duke University
www.fuqua.duke.edu/execed.html

Harvard University
www.exed.hbs.edu

Stanford University
www-gsb.stanford.edu/eep/index.html

University of Chicago
gsbwww.uchicago.edu/programs/exec-ed

University of North Carolina, Chapel Hill
www.bschool.unc.edu/infocenters/exec_ed.html

John Gallagher, Duke University's co-director for the Center for Innovation in Global Business, has created an IT infrastructure so robust and far-reaching that the Fuqua School of Business is able to deliver its Global Executive MBA (GEMBA) program around the world. GEMBA is a 19-month program during which working executives constantly keep in virtual touch with each other. The entire class first meets at Duke's campus in Durham, N.C., then works on projects and assignments online. They meet face-to-face four more times at sites in Europe, Asia, Latin America and, finally, for graduation at Durham. (For more on IT strategy in MBA programs, see "Needs Improvement," Page 40.) Duke's executive education students also benefit from the infrastructure, which was conceived by Gallagher. For example, they enjoy connectivity of enormous bandwidth—no one grows old waiting for a message to download. "We give them an infrastructure that is as good or better than any they see in the corporate world," says Nevin Fouts, associate dean for IT at Duke.

Another proponent of hands-on learning is Robert Sullivan, dean of the Kenan-Flagler Business School at UNC. "Our thought is to immerse people in [a technology] environment," he says. The school will soon conduct classes in the $22 million Rizzo Center to be completed in 2000. Designed with custom executive education programs in mind, the 18 state-of-the-art classrooms will have network and Internet connections and advanced multimedia capability. Dining hall tables are positioned over floor outlets for easy laptop access—at UNC, you'll stay connected while you feast on French fries.

Harvard's McFarlan concurs with his colleagues at Duke and UNC about the value of total IT immersion to teach executives about the strategic uses of technology. McFarlan says that executives attending Harvard "live in a complete intranet environment—class registration materials and assignments all come online. Few people [at their jobs] have the facilities we have available for an 11-week session." One South African executive attending Harvard was so impressed by the school's infrastructure that he called home to be sure every manager who reported to him had equivalent systems on their desks before he returned from Harvard's Cambridge, Mass., campus. That's the value of experiencing technology hands-on.

If you're thinking of making a move back to campus for a spell, weigh the costs of an education in terms of time and money. You can surely find the program perfect for your needs (see "Find It Online," above). But when choosing an institution right for you and your colleagues, be sure to examine how nourishing the IT education will be. No one ever ran tomorrow's enterprise with yesterday's skills. Time and money are certainly costs, but ignorance, after all, is very, very expensive.

Senior Writer Perry Glasser can be reached at glasser@cio.com.

Windchill™

What were we thinking?

A few thousand years ago, a good foundation looked something like this (hold upside down). More recently ('96), a small group of cutting-edge software technologists explored a new architectural paradigm. They envisioned the powerful impact Web technologies could have on enterprise information management systems. One year later, their revolutionary, Web-centric foundation was in the hands of some of the most sophisticated OEM computing environments in the world. Today, the group and the technology known as Windchill have joined the Parametric Technology team.

Together, we discovered we have more in common than cutting-edge technology. We share a conviction that many of the obstacles facing manufacturers can be solved by linking product life cycle data throughout the value chain – and providing the best-in-class tools to make it work together.

Windchill delivers enterprise-class security, performance, and data management capabilities – without the problems of top-heavy client/server systems (hold right-side up now).

So there's no lengthy, expensive implementation phase (remember the pyramids?) to interfere with productivity. And the flaw of the traditional client/server approach – that it attempts to impose a "uniform data model" on today's heterogenous environments – is eliminated by the flexibility of Windchill's Web-based Foundation architecture.

Windchill allows a federation of diverse systems (monoliths are so passé) to behave as a unified whole. The result is an agile "virtual enterprise" system that responds to business dynamics as easily as you can download smart, Java-based client software. What were we thinking?

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Mapping Your Success

GIS used to be the secret weapon in business-site selection. Now everybody's using it, but smart companies are finding new ways to profit from the not-so-new technology.

FOR SEEMINGLY ARBITRARY REASONS, A WELL-KNOWN BUSINESS CAN prosper in one location and quietly perish in another. But on closer examination those reasons boil down to the three fundamental principles of real estate: Location. Location. Location. That's the oft-quoted motto of realtors everywhere, and perhaps the only thing that stops you from rolling your eyes at the hackneyed phrase is that it's so true.

Site selection can be tricky, but companies looking to establish new business locations or consolidate existing ones have a helpful resource—besides a realtor—to draw upon. A geographic information system (GIS) consists of digital mapping software that displays demographic information and proprietary corporate data such as sales figures on area maps. Examining information geographically reveals infrastructural factors (like highway access) alongside the demographic makeup of an area and provides a more cohesive picture of whether a prospective site fits a particular business.

If the saying that 80 percent of a company's business comes from 20 percent of its customers holds true, it's no wonder GIS is popular, since it can help get you get close to that 20 percent. Adding to its attraction is that GIS has become increasingly user-friendly. GIS used to have an unsavory reputation. It was considered expensive and difficult to operate, and it demanded a large investment with only teasing promises of a return. In recent years, however, companies like Environmental Systems Research Institute Inc. (ESRI), MapInfo Corp., Oracle Corp. and most recently Microsoft Corp. have brought mapping from the back office of the IS professional to any user's desktop. The simplified front end allows its use beyond the boundaries of the mapping or engineering department, even in the executive suite.

Reader ROI

USING A GEOGRAPHIC information system (GIS) can mean the difference between a business location that flourishes and one that fizzles. This story tells you

- The resources necessary for achieving GIS success
- How GIS enables new business opportunities
- Why good data is the key to GIS

BY DAINTRY DUFFY

ILLUSTRATIONS BY JOHN UELAND

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Cold War's Legacy

What to do with spy photos when there's no clear and present danger

DURING THE COLD WAR, THE RELATIONSHIP OF THE UNITED STATES with Russia was simple: They watched us, we watched them. It was a tense but uncomplicated time when everyone stood on one side of the line or the other. For those who hark back to those days with misty-eyed fondness, the Terraserver Web site might change your mind.

The Terraserver sells highly detailed snapshots taken by Russian spy satellites during the Cold War, which are now being used by American companies for site selection. Companies can overlay demographic data on the pictures to determine where an optimal site for their business might be. The Terraserver is the result of a collaboration between Aerial Images Inc. of Raleigh, N.C., Microsoft Corp., Digital Equipment Corp. (now Compaq Computer Corp.), Eastman Kodak Co. and Sovinformsputnik, the interbranch association of Russian Space Agencies in Moscow.

The SPIN-2 technology, which creates the pictures, is the highest resolution satellite imagery possible, with visibility of any object two meters or larger. To give you an idea of the image clarity, at two-meter resolution it is possible to tell the difference between a pickup truck and a sedan photographed from the orbiting satellite.

Aerial Images first came up with the idea of utilizing the Russian satellite images in 1988, and several years of tough negotiations followed. "It was one of the toughest sales jobs I ever had," recalls John T. Hoffman, president of Aerial Images. "Just imagine walking into a meeting with representatives from the army in Moscow, sitting across from them and saying, 'Let us declassify your technology.' It was a bit like a Tom Clancy book in the beginning," he says.

But by 1992 the climate was right for a deal. The Russians needed money, and the relationship between Vice President Al Gore and then Prime Minister Viktor Chernomyrdin had created an atmosphere that supported the deal. Once the Russians became convinced that releasing these images would not compromise their security, the partnership was formed in 1995.

Russian satellites still provide images for the Terraserver site (*www.terraserver.com*). They send the satellites up for a short-term mission twice a year. The satellites take the pictures and then return to earth. The Russian side of the program is now under civilian control, and the money earned from the images goes to Sovinformsputnik, where the income is greatly needed.

–D. Duffy

Companies previously discouraged by GIS's technical difficulties are now being lured into the market. "You don't need to know all the back-office stuff anymore," says Jim Aylward, executive vice president at Cambridge, Mass.-based Harvard Design and Mapping Co. Inc. "You no longer have to go out and learn the GIS encyclopedia; you just need to bring in smart people to design a system that displays what you want." While most companies still need personnel trained in GIS technologies to maintain the system, the information can be accessed, understood and used by almost anyone.

The corporate user base of GIS is also changing. Historically, the largest industry users of GIS have been utilities and telecom companies, which employ it to track and maintain their complex networks and to model areas where future network bandwidth will be needed. But recently GIS's use in the government, transportation and retail industries has grown. And increasing numbers of companies are using the technology to develop marketing strategies, sales-force deployments and business-site selections.

Companies that view GIS as an easy fix for site-selection needs, however, should be cautious. It can be valuable in decision-making, but it's high-maintenance and requires significant, ongoing investments of time and capital. Regardless of the skill involved in implementation and upkeep, GIS will probably give a company some useful information, but the real competitive advantage goes to organizations intent on doing it right.

Mapping New Sites

Claritas Inc. in Arlington, Va., is one of the largest providers of demographic information to vendors of mapping software. Andrew Paul, executive vice president of Claritas, recalls the case of a chain of hearing-aid stores that opened in strip malls across Dallas. The company's executives couldn't understand why some branch locations got only a fraction of the traffic of others in the city. It turns out nobody had bothered to check the public transportation routes in the area surrounding the new stores. Elderly customers who made up the lion's share of the company's clientele were unable to get to some of the stores, and those sites were unsuccessful. GIS allows companies to map relationships like the connection between customer age and public transportation routes, which can easily be missed if not studied visually.

Sears Roebuck and Co. of Hoffman Estates, Ill., has used GIS for site selection since 1988 and has witnessed its evolution from a crude technical tool to an enterprisewide asset. Sears is in a unique position to take advantage of GIS, due to the wealth of information it has about its customers. Roughly one of every two U.S. households has a Sears credit card, and by tracking credit card purchases by store location, Sears has developed very strong data to fuel its GIS. The company uses the system to identify the geographic customer pool for each store, generate market share analyses and perform gap analyses on stores where area sales per capita suggest an opportunity for new stores.

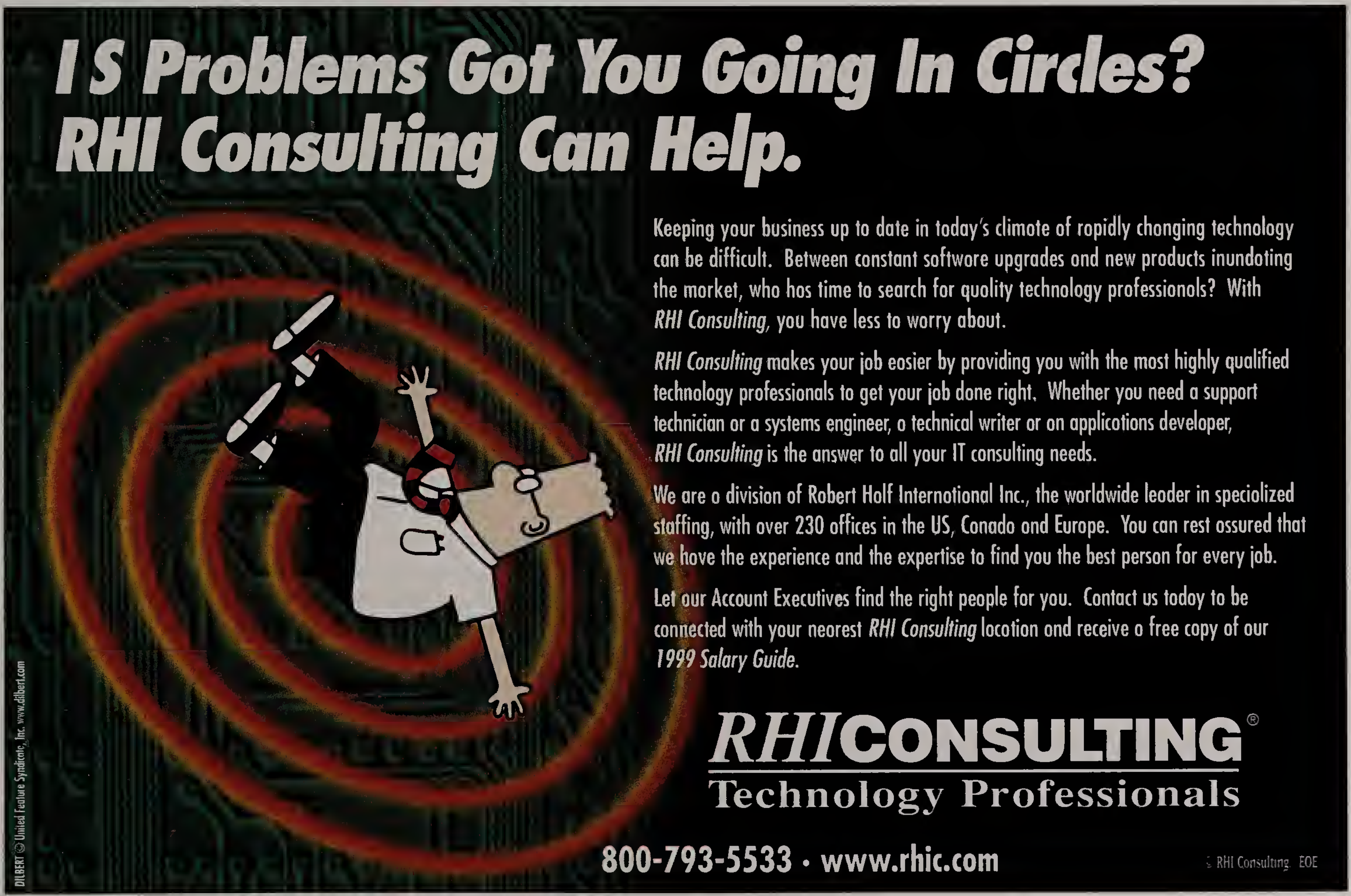
> “I’ve seen databases that show stores located in the middle of the Hudson River.” –GREG KERFOOT

Mapping New Opportunities

Rolling out several hundred new stores per year, Blockbuster Inc. of Dallas has put a great deal of work into its GIS, and that has created new opportunities for the company. Blockbuster had an unofficial policy of seeking locations only in larger towns where it felt the demographics could support a standard-sized store. Company strategists have realized, however, that Blockbuster can enter small-town markets with smaller stores and more targeted content. Blockbuster can tailor its video stock to the demographics of an area, as shown through its GIS, and open a store with 6,000 movie titles instead of 10,000. When a new store opens, business is drawn away from an existing store. Blockbuster also uses GIS to model that effect so it can keep one store from sinking another.

Mail Boxes Etc. (MBE), headquartered in San Diego, has been using GIS technology for about 10 years to establish locations for its mail centers. The company currently has about 3,000 centers nationwide and rolls out 1 new center each day on average. However, as a franchise operation, MBE must find a franchisee to buy and run each store. GIS has become a marketing tool for the company, allowing it to show a prospective franchisee the demographic information that makes a new location promising.

Government agencies have also found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GIS helpful in marketing their cities or towns. ACE Hardware Corp. planned to open a distribution store in the Saratoga, N.Y., area. Before it would commit, however, the company wanted to know how many people with the requisite skills to staff a distribution store lived within a 30-minute drive of the prospective location. ACE turned for help to the Saratoga Economic Development Corp. (SEDC), a local economic developer funded by the county and business members, but SEDC was stumped. It, in turn, approached the New York State Labor Department for information about area demographics. Both entities had bits of information but not enough to create the comprehensive picture ACE Hardware was looking for. Together they took the problem to Geographic Data Link LLC, a GIS consulting firm in Troy, N.Y. It helped the Labor Department build a GIS that it could use to field the kinds of questions ACE had asked as well as to attract other businesses to the area. Since the system's implementation in 1996, the N.Y. Labor Department also realized that it can use the system for other projects. The department now uses GIS in programs such as Welfare to Work, where it gives welfare recipients information about public transportation routes and local child care providers to help facilitate their entry back into the workforce.

The merger of Chase Manhattan Bank with Chemical Bank in 1996 made GIS a necessity as opposed to an opportunity. The two banks had many branches and ATM locations servicing the same areas. Chase used GIS to review both companies' ATM sites and branches to identify those that could be closed. According to Lee Burton, industry manager for banking and insurance at ESRI, a vendor of GIS business solutions in Redlands, Calif., Chase has the use of GIS down to a science: The bank analyzes the foot and road traffic within a one-block radius of its locations both day and night in order to position ATMs in the optimal place. Chase also uses the forecasting capabilities of GIS to determine which geographical areas are growing in business and residential population. Based on this information the bank provides services that garner more of what it calls the "wallet share."

> "ROI depends not so much on the product but the expertise of the people using it." —FRED BUSCHE

GIS can be used on a worldwide scale for business-site selection, but it can be used just as effectively to study a single building. Bally Gaming Systems in Las Vegas produces slot machines and casino floor monitoring systems and uses GIS on casino floors to display real-time and historic information about the revenue performance of each machine. A report is produced for each machine on demand, providing summary information on number of games played, revenue and number of jackpots. The system also tracks past layouts of the casino floor so that managers can compare what happens when they move machines around. This allows the management to maximize the profitability of each machine by placing it in the ideal place on the casino floor.

Ian Finnimore, Windows development manager with Bally Gaming, says, "GIS helps save money and make more money by getting poor performing machines off the floor." Finnimore points out that GIS has also helped in evaluating different marketing promotions. For example, Bally can analyze the traffic patterns of a promotion, such as slot machines surrounding a grand prize of a new car, to determine when the promotion has gotten stale. Like other companies, Bally Gaming uses frequent-player incentive cards to track its customers. The company offers benefits to customers who sign up for the cards, but the true beneficiary is Bally. The company also tracks who customers are, where they live, how they spend in the casino and which games they play. It plugs this information back into GIS so it can target customers more effectively in the future. GIS also shows data on groups or junkets, helping the casino measure the effectiveness of special offers.

Both Sears and Blockbuster use GIS as an important tool for getting executive approval on projects like store expansions. The finance group at Sears looks at GIS data to ensure that the numbers support a proposed expenditure and uses the data in reports it prepares for CEO Arthur Martinez. For example, it used GIS to gain approval for the purchase of seven defunct Broadway department stores near San Francisco, where Sears did not have a strong presence. GIS identified the locations showing demographic areas that best fit Sears' customer profile.

Mileage from Mapping

With so many companies using GIS for site selection, it would almost seem to nullify the competitive advantage. S.J. Camarata, director of corporate strategies for ESRI, recalls an encounter he had with a competitor of one of his large retail clients. When Camarata asked about the company's use of mapping technology, its representatives said they didn't need it. "We just look at where [your client] is going and put our store across the street."

The competitive advantage of GIS has not disappeared, but with so many companies using it, the emphasis is now on using the technology to the best advantage. At Blockbuster, GIS was originally used only within the corporate real estate department. Field reps looking for new sites would send requests to the department for impact studies and reports. The real estate department wasn't aware of priorities in the deals going on in the field, which increased the chance of missing deadlines and causing the company to lose out on promising properties. It wasn't until Blockbuster put GIS into the hands of its real estate field reps that the system could be used to its full advantage. It became an enterprise resource for the company and not just a real estate tool.

Besides using GIS to confirm suitable sites for its stores, Blockbuster uses it to determine how a particular store should be stocked. By layering video rental figures over maps of area stores, analysts can see what kinds of movie rentals are popular in different areas and stock the stores accordingly. For example, a store close to a grade school might offer a larger selection of children's movies and video games with the expectation of high traffic from younger age groups.

Sears, too, makes decisions beyond site location with GIS. For example, linking ZIP codes to purchasers in an urban area with a high percentage of renters, Sears might open a store that has only a small lawn and garden department, knowing that there will be less demand for such products.

According to Greg Kerfoot, national director of store location, research and planning for Sears, one of the big challenges in using GIS is obtaining reliable data. Most companies base their data on the U.S. census and then layer their own predictions and models on top of it. Considering that the last census was taken in 1990 and that the pace of change can be brisk, the currency of data is often dubious. But age isn't the only problem. "The quality of database demographics is pretty unbelievable," confides Kerfoot. "I've [seen] databases that show stores in the middle of the Hudson River." The key, according to Kerfoot, is for companies to combine information that they purchase with their own customer data such as customer ZIP codes and point of sale information. Kerfoot also cautions companies not to be seduced by slick GIS presentation packages and beautiful demo maps that seem to appear spontaneously. "There's a lot of preparation that goes into that level of spontaneity.... It's not one button, press and go. There is a learning curve."

Though current GIS applications are much simpler than their predecessors, users agree that skill is still required for effective use of the system. "ROI depends not so much on the product but the expertise of the people using it," says Fred Busche, business intelligence specialist for IBM Global Business Intelligence Solutions in Somers, N.Y. Untrained users and poor understanding of the technology can lead to the "garbage in, gospel out" phenomenon, in which people place absolute confidence in the output of an application regardless of the data they put in. "You get all kinds of very convincing visual evidence," says David Sonnen, senior consultant with Framingham, Mass.-based IDC Research (a sister company of CIO Communications Inc.). "It's easy not to question the underlying assumptions when you have a nifty full-color map that displays information in a very convincing manner." Executives who use GIS need to understand the information that fuels the system and the assumptions that have gone into gathering that data.

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STC™

Operator Assistance

Iridium's satellite telephone network delivers communications—and customer service—to A-list customers in some of the most remote spots on earth

BY TRACY MAYOR

LIKE A LOT OF OTHER CUTTING-EDGE ELECtronics consumers worldwide, Ronald Naar spent last summer tracking the progress and availability of Iridium, the new satellite telephone service that promises to deliver communications capabilities to the four corners of the globe. Nine years in the making (see "Ground Control," *CIO*, April 1, 1996), the satellite network was only then getting into place. And handsets, which run about $3,000, were (and at press time still are) in short supply.

hola
howdy
salut!
ciao!

But Naar was a man quite literally on a mission. He wanted—make that needed—an Iridium phone to help him and his partner, Coen Hofstede, communicate with the unfrozen world as they embarked on a 75-day trek and para-sail across the continent of Antarctica. Naar's first move was to call Iridium's brand-new Global Customer Care center (at 800 628-4910) to inquire about getting a handset in time for the expedition's departure.

"We started [trying] in May and got a phone only two hours before we were leaving [in November]," says Naar, speaking over the Iridium handset on day 32 of the expedition, when he and Hofstede were virtually becalmed in windless conditions and temperatures of minus 34 degrees Celsius. "We got just the phone. There were no instructions and no time for training," Naar recalls. "I just took the whole thing and ran to the airport."

Preoccupied as he was with anemometers, aluminum fuel cylinders and para-wings, Naar most likely didn't give much thought to the details of Iridium's customer-support plan. But behind his initial phone call is a vast customer-support web that's nearly as complex and ambitious as the satellite network it aims to support. And as Naar eventually learned, it can even advise Antarctic travelers to properly warm their batteries before dialing.

Washington, D.C.-based Iridium LLC's Global Customer Care (GCC) program offers 24-by-7-by-365 telephone support in 13 languages to customers literally anywhere in the world. Iridium customers, who use one telephone handset and are reached at one telephone number regardless of their location on the globe, call a single number from any country to reach GCC and, after keying in a short code, are routed to an operator who speaks their preferred language.

For times when the phone itself isn't working, users can reach GCC via a toll-free or low-cost local phone number from 70 countries. And GCC even promises delivery of new handsets within three business days to those who have damaged or lost theirs, in some cases navigating customs, sensitive borders and other geographic vagaries to do so.

Behind the scenes, a virtual private network links the three physical locations—Maitland, Fla.; Zoetermeer, Netherlands; and Sydney, Australia—that make up the call center. Data is instantly and constantly replicated among the three sites, so customer files are always live regardless of which physical location has fielded the phone call. Calls are automatically routed

ILLUSTRATION BY ROB DUNLAVEY

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depending upon time of day and the availability of an operator who speaks the caller's language. A SIMM card inserted into the Iridium handset transmits subscription information to authenticate the subscriber and determine access rights when a call is placed to the GCC center.

If all that sounds expensive and complicated, it is. Iridium officials and Booz, Allen & Hamilton Inc.'s consultants who worked with the company to develop GCC strategy and bring the GCC online all declined to put a price on the program's development costs. But according to Mark Gercenstein, Iridium's senior vice president of business operations, the company plans to spend between $50 million and $100 million on customer care over the next two years. "Of course," he points out wryly, "if we have no troubles and nobody calls us, that number could be a lot lower."

Money aside, the development team had to clear multiple hurdles in its quest for a truly global customer service program, including overcoming language barriers, negotiating business agreements with telephone providers worldwide and maintaining relationships with both customers and business partners without alienating either group.

Given the time and trouble involved, why did Iridium bother? The company has no alternative if it hopes to woo and win the attention of the top-flight customers who are likely to be its early adopters, says Jack Gold, a senior program director at Meta Group Inc., a Stamford, Conn., research firm. "At $3,000 a handset and 3 or 4 bucks a minute, you'd better make sure people are happy. You're not just talking about drop-

No Price Cap to the Icecap?

Wherein our reporter learns that the sky's the limit in billing for satellite services

WITH ESTIMATES RANGING FROM $1 TO $4 A MINUTE FOR Iridium service, high-quality satellite phone links to remote locations seem merely pricey—not outrageous. But my experience teaches that the escalator can rise to unimagined heights, even if only temporarily. When billing for service passes through multiple carriers, funny things can happen to the cost profile, for which no one seems able to take responsibility.

My eight-minute, direct-dial call to Ronald Naar in Antarctica (note to editors: I know, I know, next time he calls me) appeared on a domestic AT&T Corp. account as a $520 charge. At those prices, you don't chitchat about the weather on the ice cap.

Since $520 was more than 10 times what I'd expected, I called my long-distance provider. After six operators and an aggregate two-plus hours of time on hold, I concluded that AT&T seems scarcely to have heard of Iridium and apparently has no earthly idea how its satellite charges are computed.

One customer service representative offered to strike the charge altogether if I promised not to make any more phone calls "like that." What a deal! But in the interests of journalism, I declined (editor's note: Thanks, Tracy!). Another offered to cut the bill a hefty decimal point to $52, but only after I volunteered that most Iridium calls didn't go higher than $4 or $5 a minute. The international operator guessed that the call was billed as a shore-to-ship communication (about 98 cents every six seconds), and indicated I'd have to pony up the full amount. Also no thanks.

Finally, a representative within AT&T's loftily named high seas adjustments investigative department said she had in fact heard of Iridium (kind of), that the charge came directly from Iridium with no markup from AT&T (really?) and that I'd have to call Iridium myself to straighten out the matter. This seemed odd. Shouldn't AT&T be willing to sort out the complex particulars of its own bills?

This was how I became an Iridium Global Customer Care customer. And I can report that the folks on the phones live up to their top-notch billing—even if it turns out they can't do anything about my billing. After dutifully reminding me that local carriers, and not Iridium itself, handle bills, each of the three representatives I spoke with went on to gather information, offered to call AT&T and Glocall (the corresponding long-distance carrier in the Netherlands), and generally behaved in a manner that was simultaneously proactive and sympathetic.

But the company still couldn't fix the bill. It took a phone call to Kathy Eisenhart, Iridium LLC's executive director for global customer care in Washington, D.C., to straighten out the mess. Long-distance carriers like AT&T treat calls to Iridium phones as if Iridium were a country. Just as Italy's country code is 39, Iridium's is 881 (all calls to users of the satellite service start with 881). Those rates are tariffed, in this case at $6.50 per minute, which means that my call, in fact, was miscalculated by a decimal point. Simple enough.

But if the charge originated entirely within AT&T, which it did, why did the company tell me to go figure it out myself? Eisenhart advised tolerance. "Don't slam AT&T too hard," she counsels. "They knew they had a billing problem with 881 numbers, and it's supposed to be fixed. But you can fix it one place and not fix it everywhere. It takes time to get that information out to the customer care force."

Finally, Eisenhart says, if you're ever worried about the cost of any call, check it out in advance. "There's a rate, and it's been set beforehand. Just call up the carrier and ask for a rate quote." So the next time an Iridium-using buddy asks, "Hey, can you call me back?" tell him he'll have to wait a sec.

–T. Mayor

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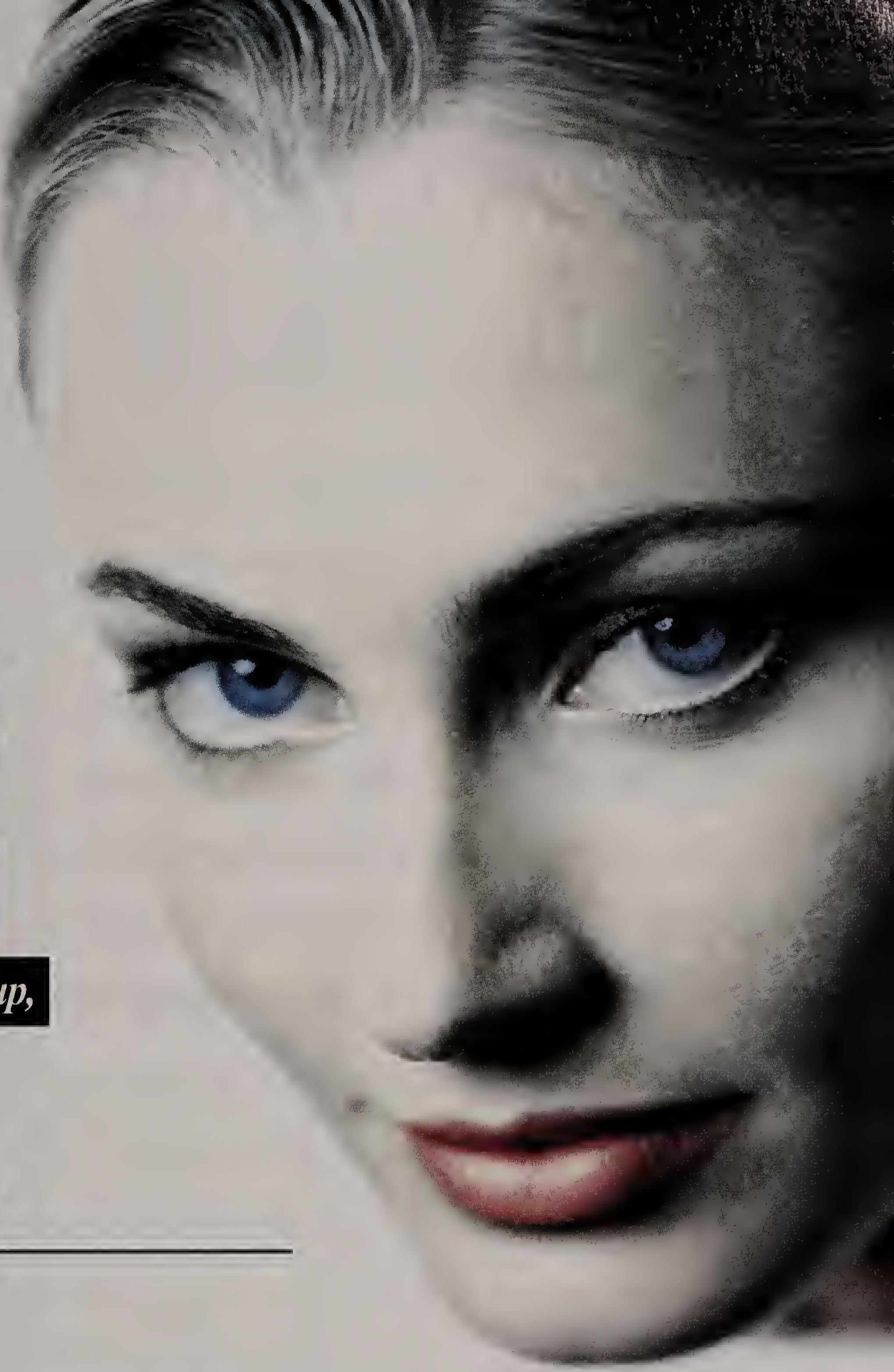
every group,

every individual is unique.



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ping a dime into a phone here," says Gold, who emphasizes that an entirely new technology like Iridium is more likely to fail occasionally, so "solving problems quickly and effectively is of major importance." (For a cautionary look at the author's high-priced call to Naar, see "No Price Cap to the Icecap?" Page 70.)

While Iridium officials say the per-minute price of the company's satellite service can be as low as a dollar or two depending upon where and when a customer is calling, they don't dispute that cutting-edge technology needs a high level of customer service, particularly among the diplomats, high-volume business travelers, and maritime, construction and oil and gas workers who have thus far been the earliest adopters of Iridium technology.

> **"If we want to put a premier tag on this service, we have to be there with a premier support product at the beginning."** —LYNN WILLIAMSON

"You get only one chance to do it right," says Global Customer Operations Director Lynn Williamson of Iridium's decision to come right out of the gate with a blue-chip customer service operation. "If we want to put a premier tag on this service, we have to be there with a premier support product at the beginning." In addition, a fully realized customer-support center raises the bar for potential competitors down the road.

"Highly mobile customers basically need a very different type of customer service," says Patrick Zerbib, vice president in Booz, Allen's Communications, Media and Technology group in New York City. "If you've contracted [for Iridium service] in Italy and you're traveling in China, you might not even know how to dial Telecom Italia from where you are." A single worldwide phone number solves that problem for the user and protects the integrity of the Iridium brand name, Zerbib says. Moreover, there are varying customer-support standards in different countries. Because Iridium service is offered by local mobile telephone providers, the company might have chosen to leave customer care to the individual providers. But, outside the United States and Japan, 24/7 support is far from being the norm.

Given the need for truly global customer service, Iridium and Booz, Allen set out to make that vision a reality. The project involved more than a few unique challenges. Language, for example, was one large stumbling block. "We can put 56 satellites up in the air, but we can't get everyone to speak the same language," Williamson says.

Iridium's solution was to establish its call centers in three locations where bilingual and trilingual employees are more readily available. The Florida center handles primarily Spanish and English, the Netherlands center handles European languages and English, and Australia covers Asian languages and English.

Such requirements make staffing the call centers a challenge, says Kathy Eisenhart, Iridium's executive director for global customer care. In addition to their language skills—which in some cases are tested by an outside translation service—applicants must demonstrate proficiency on the computer, be able to type and talk at the same time, and pass basic listening comprehension and grammar tests, which are administered as part of an interactive PC-based program.

The decision to support 13 languages (plus a separate language line for other dialects not covered) caused a particular headache for the people charged with setting up terrestrial backup lines for customers to call when they have problems with their Iridium phones. "The easy 800 number was a big challenge," recalls Peter Grambs, a principal with Booz, Allen's IT group. "It had to be done country by country, and each time we needed 14 different numbers, one for each language plus the language line."

There was no alternative to simply slogging through, striking agreements with local service providers one at a time for toll-free numbers or, where those weren't available, low-cost local phone lines. That same principle applied when it came to building a network of delivery companies that would be able to make good on Iridium's promise to replace broken or lost handsets.

For all the preparation and problem-solving, the concept of Global Customer Care as a strategic selling point is still an unproven and expensive gamble. The Iridium network itself was officially launched Nov. 1, 1998; but with handsets still in short supply, it's difficult to guess when customer numbers will ramp up, Iridium officials concede.

So far, calls to the GCC have been primarily informational—the phone center doubles as a sales support and inquiry line—or have been from first-time users anxious to get going without reading their manuals, according to Lisa Smith, global client process consultant for Sprint Telecenters Inc., which is contracted to run Iridium's Florida call center. "People are just getting their hands on the handsets, and they want to know how to dial and how to use the phones," Smith says. The most common themes are what am I doing wrong and how come I can't make a call?

More exotic problems such as Naar's difficulties with frozen batteries aren't yet the norm, Smith says. Local service providers that have just begun to offer Iridium to their most-valued customers tend to treat them with kid gloves. As a result, questions that may one day wind up at the GCC are being handled on a local level for now. For example, Naar's local carrier, the Netherlands-based Glocall, which has been aggressive in both supporting and promoting him, solved his battery problem by suggesting he first warm the battery unit (via solar panels placed on top of his tent) before placing it in the handset.

At this early stage of the game, the GCC staff remains convinced that the global call center makes good business sense. "Consistency of service across the world is going to be a significant contributor [to satellite market growth]," declares Eisenhart. "This service has to work to meet your expectations, and we think a one call, one phone number will be a big attraction."

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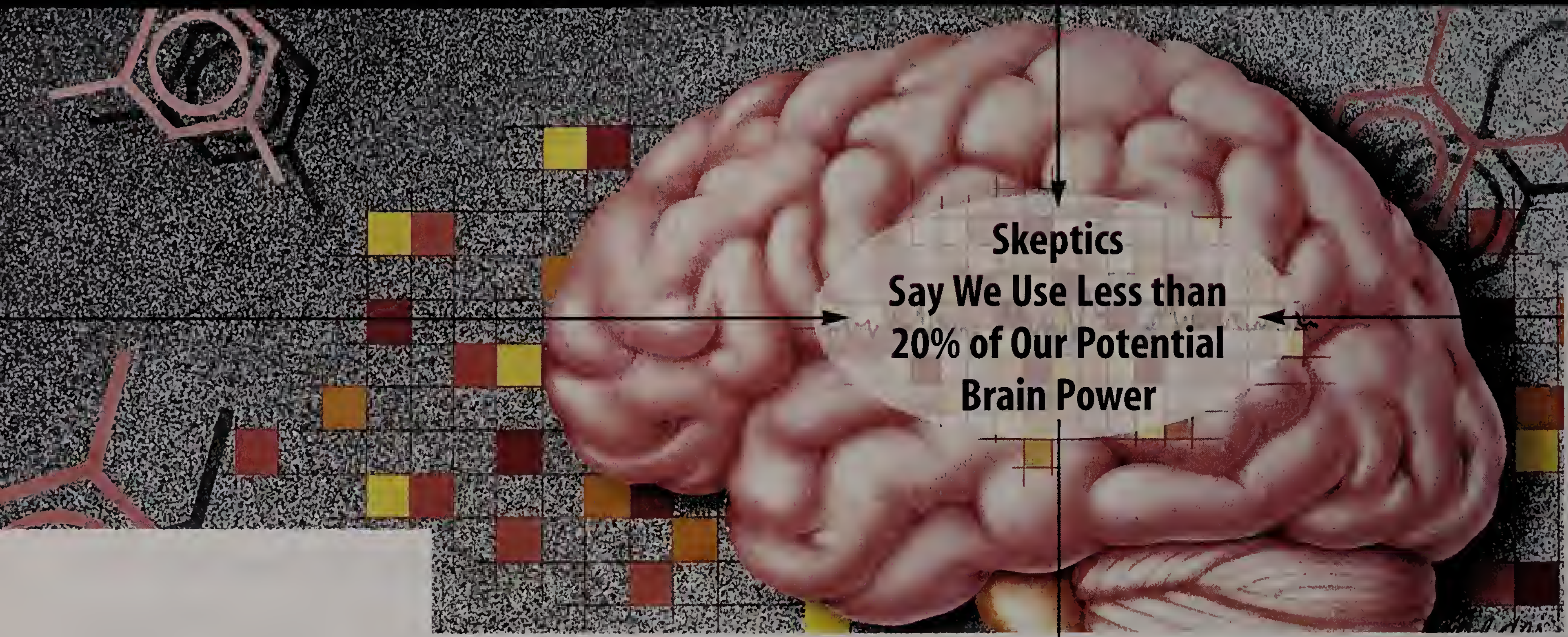

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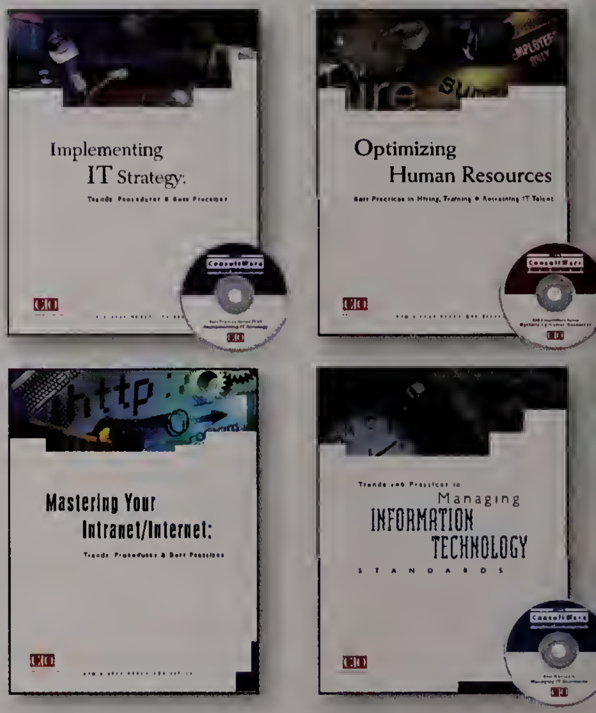

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Index

Page numbers refer to the first page of the article(s) in which the company is mentioned. This index is provided as a service to readers. The publisher does not assume any liability for errors or omissions.

Company Index

Ace Hardware Corp. 62
Acer America Corp. 16
Aerial Images Inc. 62
Bally Gaming Systems 62
Barnett International 30
Bechtel Corp. 50
Blockbuster Inc. 62
Booz, Allen & Hamilton Inc. 68
Charles Schwab & Co. Inc. 40
Chase Manhattan Bank 62
Ciba Vision Corp. 30
Citicorp 40
Claritas Inc. 62
Compaq Computer Corp. 16
Eli Lily and Co. 30
Environmental Systems Research Institute Inc. .62
Fidelity Investments 40
Financial Executives Institute 16
Ford Motor Co. 16, 50
Fresh Express Inc. 50
General Electric Co. 16
Geographic Data Link LLC 62
Harley-Davidson Inc. 40
Harvard Design and Mapping Co. Inc. 62
Heidrick & Struggles International 16
IBM Corp. 62
Intel Corp. 40
International Data Corp. 62
Iridium LLC 68
John Hancock Mutual Life Insurance Co. 40
Mail Boxes Etc. 62
MapInfo Corp. 62
McKinsey & Co. 40
Meta Group Inc. 68
Microsoft Corp. 16, 62
Miller Brewing Co. 50
Nike Inc. 40
Novartis AG 30
Oracle Corp. 62
Pfizer Inc. 30
Sears Roebuck and Co. 62
Sprint Telecenters Inc. 68
Starbucks Coffee Corp. 50
Texas Utilities Co. 50
Thomson ESG 50
Toshiba America Systems Inc. 16
United Memorial Hospital 50
Xerox Corp. 16

Advertiser Index

**Denotes Section 2 Advertisers*

Acucorp Inc. 13*
Amdahl Corp. 5
American Power Conversion 54*
Aspect Telecommunications 20*
Autonomy Inc. 19*
BMC Software 47
Chubb Computer Services 65
CIO Communications Inc. C3, 74*, 75*
Cisco Systems Inc. 11
Comdex 25
Compaq Computer Corp. 27, 29
Computer Associates Intl. Inc. C4, C4*, 48
Compuware Corp. 14*
Corepoint 28*
Data General Corp. 25*
Dataware Technologies 37*
Dell Computer Corp. C2
DLTtape Systems 27*
Dun & Bradstreet Software 77
EDS Corp. 19
Ernst & Young LLP 8, 38*
ESPS Inc. 73
Executrain Corp. 71*
Gateway 61
Great Plains Software 33
GTE Corp. 5*
Hewlett-Packard Co. 40, 43
Hirsch International 47*
Hummingbird Communications 35*
IBM Corp. 11*, 45, 48*, 67
IDG.net/CNN.com 77*
IFsec LLC 31
Information Builders Inc. 33*
International Data Corp. 73*
International Network Services .... C2 Flap*, 7*
Interpath 57*
L-3 Network Security Systems 17*
Lockheed Martin Corp. 39
Lotus Development Corp. 34
MCI Communications Corp. 68
Mercury Interactive 53
Microsoft Corp. 2
MKS Inc. 79
NEC 75
Netopia 59*
Network Associates 14
Novell Inc. 22
ObjectShare Inc. 57
Oracle Corp. 7
Parametric Technologies 61*
PeopleSoft Inc. C2*
Planview 69*
Prestige Software 53*
Quantum Corp. 54
Rational Software Corp. 2*
Robert Half 65*
SAS Institute Inc. 21
Sequel Technology 45*
Software Technologies Conference 67*
Sprint 13
Sqribe Technologies Corp. 71
Syntel 59
Tenfold Corp. 23*
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Unisys Corp. 17
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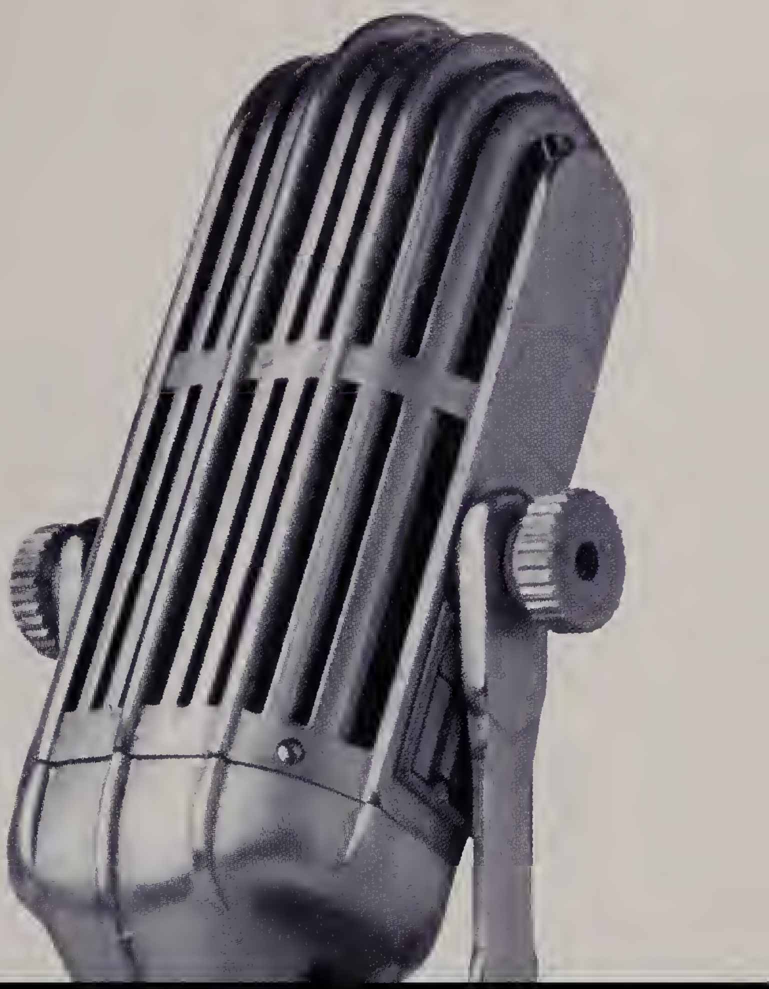

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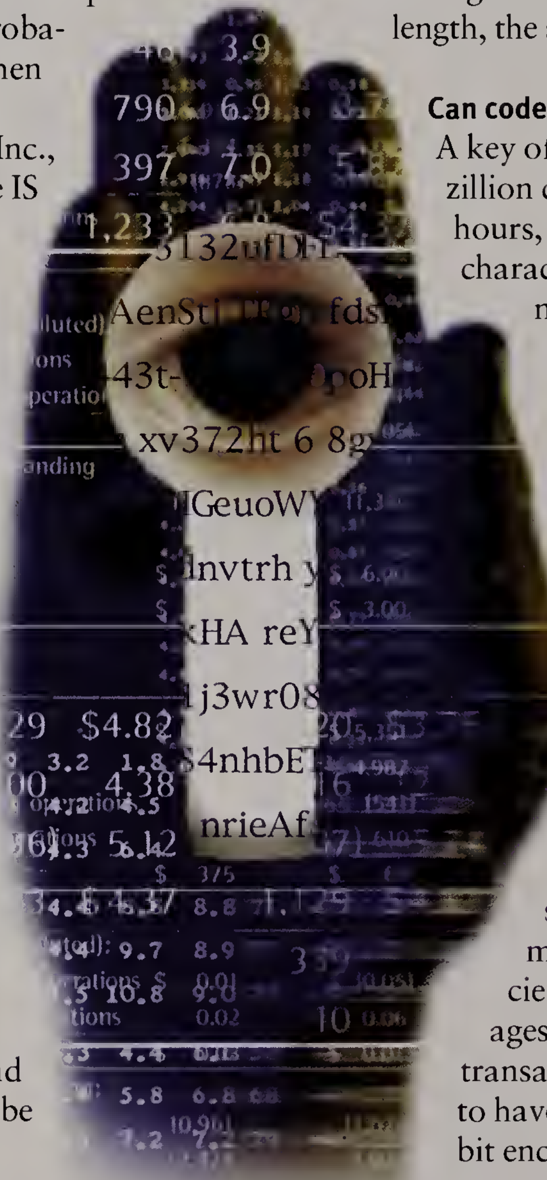
What's Encryption?

ALI BABA GAINED ENTRANCE TO THE CAVE of the 40 thieves because he learned the password "Open sesame!" But you probably missed the part in the story when Mustafa ben Mustafa, senior vice president and CIO of 40 Thieves Inc., got the ax. Literally. The CEO admired the IS group's voice recognition software, but when it came to corporate security, poor Mustafa's staff simply did not perform to expectations. And when heads rolled at the company's corporate headquarters, it wasn't a pretty sight. If only Mustafa had understood encryption.



How do codes work?

Any company that wants secure communications among workers or between itself and customers has to pay attention to encryption schemes. The familiar Morse code is an example of an encryption scheme that uses symmetric algorithms. It's symmetric because both parties use the same process for coding and decoding the communications. If we wanted, we could switch to another code as long as the two of us agreed in advance what the symbols stood for, but someone who tapped into our messages and thought we were using Morse code would be very confused.

If our computers don't share algorithms, one of us would be staring glumly at a screen of confusing gobbledygook. Therefore, we must agree on an algorithm. The number of symbols in the code is called key length. The greater the key length, the more secure the algorithm is; but the greater the key length, the slower our computers operate.

Can codes be broken?

A key of any length can be broken by a zillion computers working a gazillion hours, substituting every conceivable character in every conceivable combination. It may take a while, but they'll hit the jackpot. A group of California researchers built a machine for approximately $200,000 that cracked a data encryption standard (DES) key—the Fort Knox of algorithms—in three days.

These days the encryption standard for many businesses that exchange credit card numbers, mailing addresses and other information on the Internet feel secure with 40-bit-length security keys, the standard on most browsers. But that's insufficient for some banks and brokerages pioneering Web interfaces for transactions. They require customers to have browsers equipped with 120-bit encryption keys.

What's the best system?

The best encryption systems are asymmetric. There are two keys, one private and one public. The keys are compatible, although independent of each other in their own coding, so many users can have the same public key without violating the security of the private key. Think of it as the lockbox that realtors use to show your house. They share a public key to access your home's private key. Because of their nature, asymmetric systems can actually go as high as 2,048-bit key lengths, yielding security that is super-duper but terribly slow.

Costs, speed, security? The trade-offs around encryption codes are complex, but as long as an informed information executive keeps her head on her shoulders, she should be able to keep Ali Baba beyond the firewall.

–Perry Glasser

Buzzwords

Authenticity: The guarantee that a message came from where it was supposed to have come from.

Trusted third party: A service offered by some organizations to verify the authenticity of a digital message. Think of it as an electronic notary public.

Digital ID: A user's public key that has been digitally signed by a trusted third party. Think of it as a government-issued photo ID.

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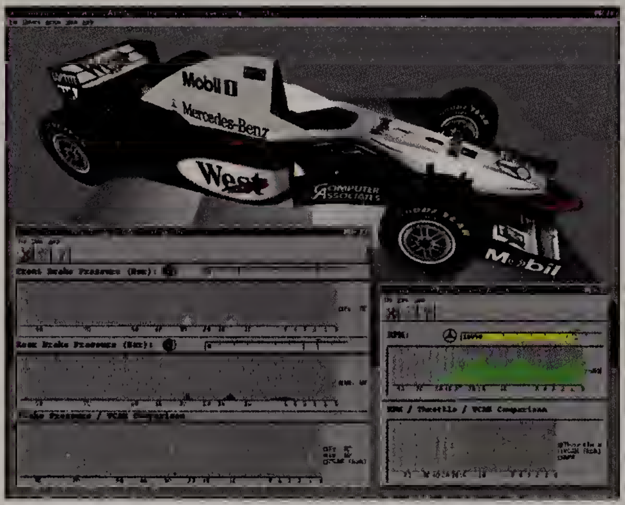

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